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The Personal Computing Magazine for Tandy® Computer Users

PCM®

Vol. III No. 3
September 1985
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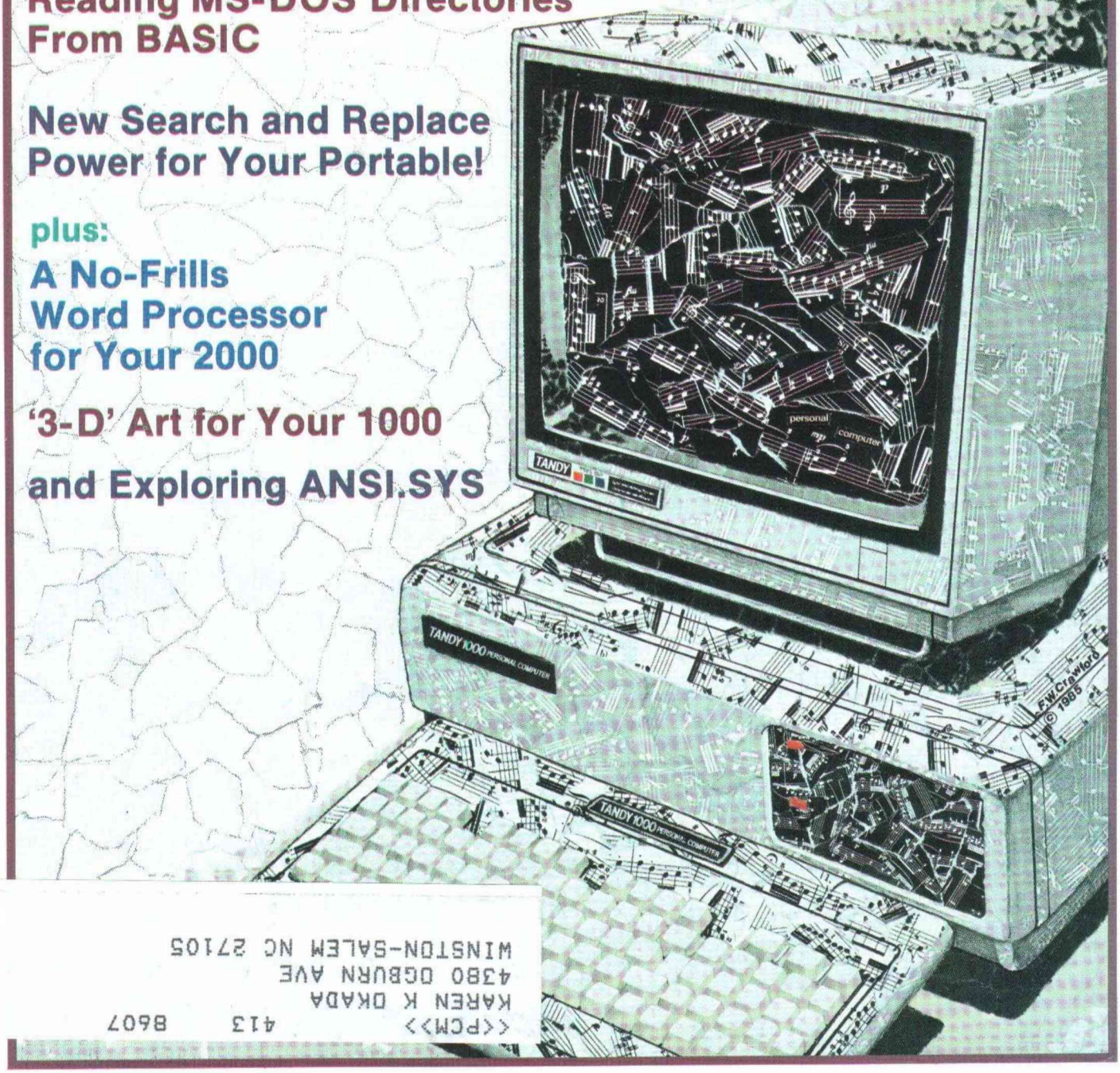

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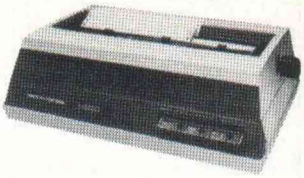

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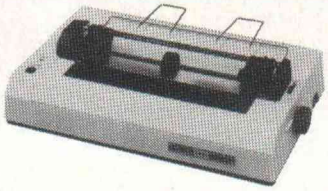

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Tandy MS-DOS Software Comparison Chart

	pfs® File/Report	dBase™ II	*filePro* 16 Smallware
GENERAL CHARACTERISTICS:			
Menu driven	yes	no	YES ✓
Allows user to create integrated business systems	no	programmer required	YES ✓
Developed systems and data can be moved to multi-user environments	no	no	YES ✓
Professional support available from the software's authors	no	no	YES ✓
PRICE	$265	$595	$495
CAPACITIES:			
Fields per record	100	32	999 ✓
Characters per record	1679	1000	4608 ✓
Records per file	1300	65535	16,000,000 ✓
Indexes per file	1	7	12 ✓
Number of digits per numeric field	20	10	24 ✓
Number of files usable concurrently	1	2	10 ✓
Files span multiple drives	no	no	up to 8 ✓
FEATURES:			
Full-screen facility for creating custom screen layouts	yes	no	YES ✓
Full-screen facility for creating custom report layouts	no	no	YES ✓
Built-in field types (error checking)	no	3	12 ✓
User-defined field types	no	programmer required	200 ✓
Conditional math	no	programmer required	YES ✓
User-defined menus	no	programmer required	YES ✓
Change file layout without losing existing data	possible	possible	automatic ✓
Data protection	no	programmer required	YES ✓
Password security	no	programmer required	YES ✓

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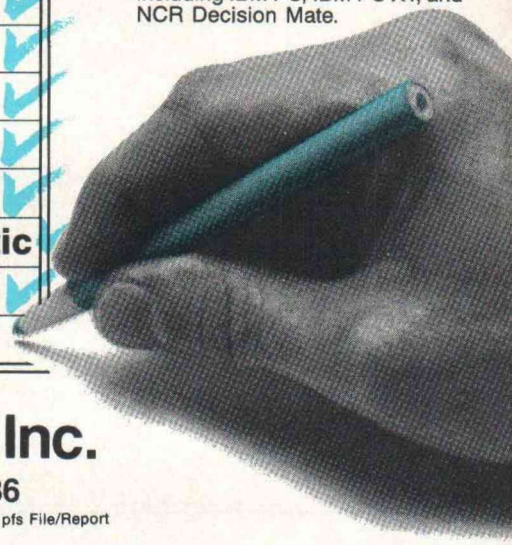

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Changes Blowing in the Autumn Winds

There are a lot of exciting things going on in our world of computers and I hope to share some of that with you.

First of all, things are *really* shaping up for our first-ever PCMfest in Princeton, October 11-13! Take a look at the information inside this issue, clip out the coupon and get some tickets now. You'll have a good time!

Our biggest PCMfest news is the acceptance by Contributing Editor Bill Barden to be our guest speaker at the breakfast on Saturday morning. Bill is not only highly articulate in print, but very personable as well, and will, I am certain, provide an excellent program.

So come to PCMfest, see the biggest display of Tandy software and hardware ever put together for the MS-DOS and portable machines, meet many of the "names" who have been a part of PCM and hear (and meet) Bill at the breakfast. This is not one to be missed.

It gives me a great deal of pleasure to be able to announce that we have a new managing editor for PCM, Danny Humphress, who moves up from his Technical Editor's slot. Courtney Noe, who gave "birth" to PCM over two years ago, moves up into the position of Executive Editor. Courtney has also been given increased responsibilities involving sister publications THE RAINBOW and SOFT SECTOR, our magazine for the Sanyo computer family.

Danny, as all of you who read these pages know, is a wizard with all the computers which are covered by PCM. He is the author of the portable bar code programs, has been "Mr. MS-DOSsier" and put together the entire report on ViaNet.

Courtney's new position will allow him to concentrate on his first love, magazine production. Our local punster as well, if you've ever groaned over one of our headlines or cover lines, Courtney — sometimes known as "Dr. Noe" a la James Bond, probably wrote it.

And there are some *other* things coming up . . . but we'll have to wait awhile to let you know about some of them. In the meantime, as you no doubt *have* noticed, PCM keeps growing and expanding and we welcome you to keep growing with us. And, too, thanks for your support — more and more advertisers keep telling me they are getting feedback from you that you saw their ads here. It really helps us grow to become the magazine you — and we — want PCM to be!

— Lonnie Falk

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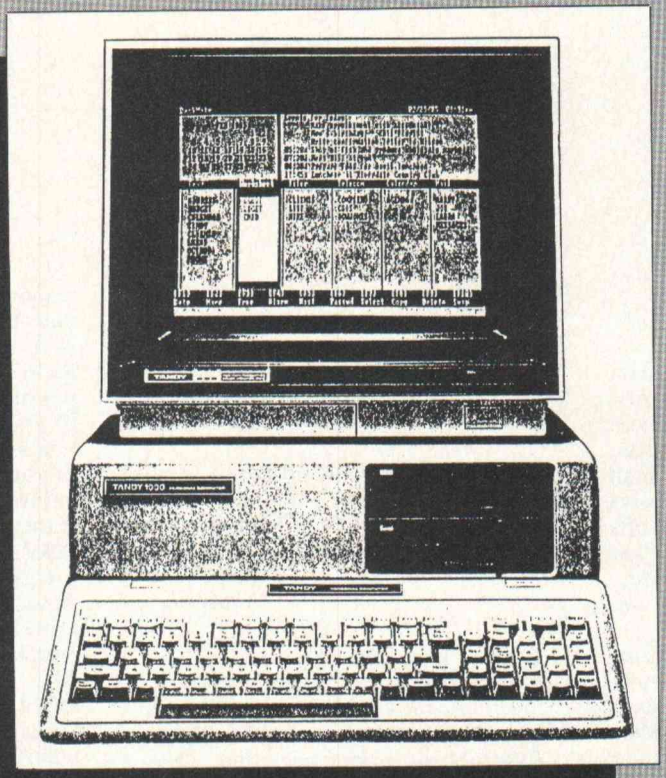

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PERFECT WORDS

Editor:

I'm finally getting to something I meant to do several months ago when I first finished configuring, experimenting with and using *WordPerfect 4.0* in my business. I'd been through five biggies (who shall remain nameless) and several less expensive programs. There were always more tradeoffs than benefits for all of them as far as I was concerned. They were poorly documented, too clumsy and inconvenient, too slow, too complex . . . too something.

What a change! *WordPerfect 4.0* is fast, straightforward, convenient, flexible, powerful, easy to use, reasonably priced and, most of all, supported beyond my wildest expectations. They don't yet have an undo function or on-screen windowing but they do have the ability to keep two separate documents resident at the same time with a "switch" function to flip back and forth and swap text, etc.

WordPerfect will truly be "perfect" with Version 5.0 due out shortly . . . Both items on my wish list are included (windows and undo). What will I find [for nitpicking] . . . not much I venture.

Alexander T. Irving
New York, NY

100 DISK COMPATIBILITY

Editor:

I recently received *Lucid* from the Portable Computer Support Group and I am enthralled with its ease of operation and speed. Along with *Text Power 100* from the Covington Group, *Lucid* allows me to handle all my sales projections and correspondence associated with my new business. And some people think they need something large and bulky to get their work done.

I would find it helpful to know if any reviewed programs can work with the Radio Shack Disk/Video Interface before I buy them and if they will show a partial or full screen display. For the record, the display for *Lucid* is the same as what you see on the 8 by 40 screen but the cursor does not work. The *Text Power 100* does not work with the DVI but they have a version of the program for it.

There is a market for programs on disk, such as the business series on multiple cassettes. Perhaps some of your advertisers might consider a move into such an area.

Gordon McElroy
Narberth, PA

Editor's Note: We try in our reviews to indicate the software written in machine code which may conflict with bar code readers, the Disk/Video Interface or other programs. The review of Text Power 100 *(February 1985 issue of PCM) mentions the need to be specific in your order of what competing machine code software you are using. More software writers need to realize, and many have, the purchaser may need to offset load their programs.*

TELECOM MATE

Editor:

The *DeskMate* software package that comes with the Tandy 1000 is really quite good.

One area I ran into that caused a little trial and error until I got it figured out is the TELECOM application. This information may be of help to some of your other readers.

I call the Dow Jones News Retrieval service rather often and the automatic logon (AUTO LOG) feature is a real joy. There are some ground rules that must be observed in setting up the AUTO LOG EDIT module, however. In addition to setting the STATUS: F1 correctly, based on Baud rate, parity, etc., and then entering the phone number in response to CALL: F2, you press F4 SEND: and type "^C" (CONTROL-C). Following that, you press F3 which gives you a RECEIVE: entry, and here is where you must pay attention to what the news service sends to your computer. You must use the exact text and symbols that they will be sending to you. And this means, if they use capital or lower-case letters, you must use the same. If they use four question marks (as in WHAT SERVICE PLEASE????) you must use four.

I use a Hayes SmartModem, 300 Baud. Attached is a screen dump of the AUTO LOG EDIT screen for automatically logging onto the Dow Jones News Retrieval service. Also attached is a screen dump of the DEFINE MODEM FOR COMPUTER DIALING screen for the Hayes SmartModem.

It is a delight to see something in print about the Tandy 1000. I love mine.

Alva M. Hill
Bellingham, WA

```
AUTOLOG EDIT
STATUS: Y,30,7,E,1,OFF,OFF,
  OFF,OFF,3
CALL: 647 0666
SEND: ^C
RECV: please type your terminal
      identifier
SEND: A
RECV: please log in
SEND: dow1;;
RECV: WHAT SERVICE PLEASE????
SEND: djns^M
RECV: ENTER PASSWORD
SEND: 39V9VIKAMH^M
```

```
DEFINE MODEM FOR COMPUTER DIALING
SEND: AT DT
NUMBER
SEND: ^M
```

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WRITE ROM is the definitive word processing extension for the Model 100. PCSG the first text formatter for the Model 100, now sold by Radio Shack as Scripsit 100. Now 18 months later PSCG introduces WRITE ROM. Those who have experienced it say WRITE ROM literally doubles the power of the Model 100.

First of all, WRITE ROM as its name implies is on a snap-in ROM. You simply take a quarter and open the little compartment on the back of the Model 100 and press it in. It is as easy as an Atari game cartridge. You can use other ROM programs like Lucid whenever you wish.

WRITE ROM lets you do every formatting function you would expect like setting margins, centering, right justifying and having headers and footers. But it does them under function key control.

WRITE ROM remembers your favorite format settings so that you can print a document without any setup, but you can change any formatting or printing parameters instantly with a function key.

WRITE ROM's "pixel mapping" feature shows you an instant picture on the screen of how your printout will look on paper.

In all there are 64 separate features and functions that you can do with WRITE ROM, and some of these features are truly breakthroughs for the Model 100.

First, WRITE ROM lets you do search and replace. Any word or phrase in a document can be searched for and replaced with any other phrase where the search words appear.

Second, WRITE ROM lets you send any text (formated or not) to any other computer over the phone with just a function key. What's more it dials and handles sign on and sign off protocol automatically.

Third, WRITE ROM has a wonderful feature called Library that lets you record favorite phrases, words or commonly used expressions (often called boilerplate).

Any place you wish any Library text to appear you just type a code. WRITE ROM automatically inserts the text just like a Xerox Memory Writer.

Picture what you can do with that kind of capability.

WRITE ROM is blindingly fast. No one can claim faster operation. Because it is on ROM it uses virtually none of your precious RAM. It works with any printer, serial or parallel. You can make a duplicate copy of a document file under a new filename. Rename or delete (kill) any RAM file with function key ease.

This description only scratches the surface of the amazingly powerful piece of software. Dot commands allow control of such things as margins, centering, line spacing and other changes in the middle of a document. Most are Wordstar compatible.

A mail merge feature allows you to send the same document to every name on your mailing list, personalized for each recipient.

WRITE ROM enables you to do underlining, boldface and correspondence mode as well as any other font feature like superscripts that your printer supports in a way that many users say "is worth the price of the program."

To underline you don't have to remember a complicated printer code. You just type CODE U, and to stop underline, CODE U again. The CODE key is to the right of your spacebar. Boldface? CODE B to start and stop. Easy to remember and do. Five different printer features of your choice.

We couldn't list all the features here. For example, not just double space but triple or any other. You can use your TAB key in a document. WRITE ROM allows you to indent. This means you can have paragraphs that have a first line projecting to the left of the rest of the paragraph. Plus many more features.

WRITE ROM has a feature unique to any word processor on any computer. It is called FORM. FORM is an interactive mechanism that lets you create screen prompts so that you or someone else can answer them to fill out forms or questionaires.

With FORM anyplace where you had previously typed a GRAPH T and a prompt in a document, WRITE ROM will stop and you are shown that prompt on the screen. You can type in directly on the screen and when you press F8 you see the next prompt. Goes to a printer or a RAM file.

Think of how you can use FORM. A doctor or nurse could use it for a patient's history with each question appearing on the screen. An insurance salesman could have his entire questionaire. You could construct a series of prompts to answer correspondence typing the answers, even using Library codes. This feature lets you answer letters in rapid fire fashion each with personalized or standard responses.

Before WRITE ROM you had to be a programmer to create a series of prompts. Now its as simple as GRAPH T.

PCSG makes the claim that WRITE ROM is the easiest, fastest and most feature rich formatter for the Model 100. We are happy to offer WRITE ROM because it expands the 100 to a dimension of text processing you cannot equal on even larger computers.

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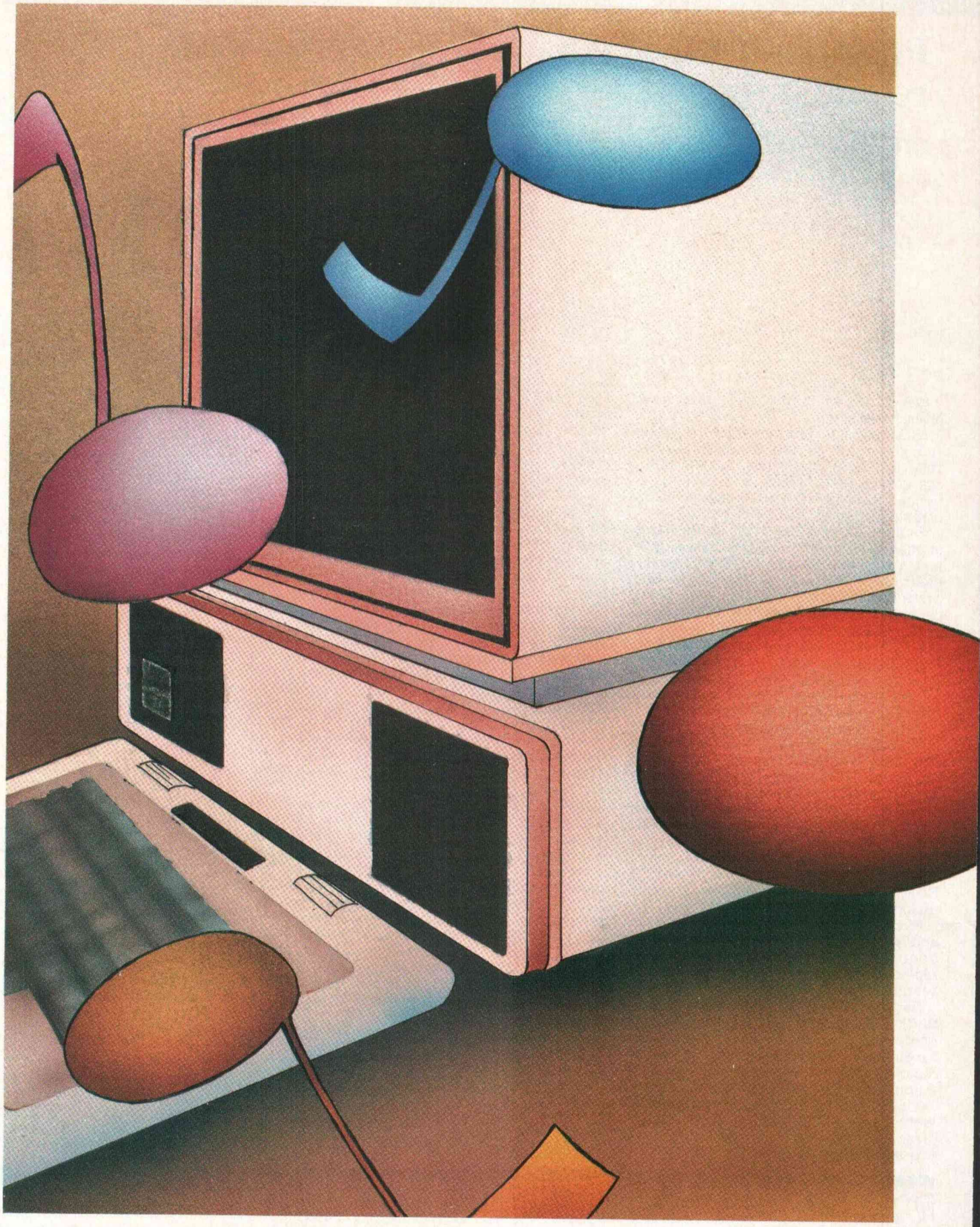
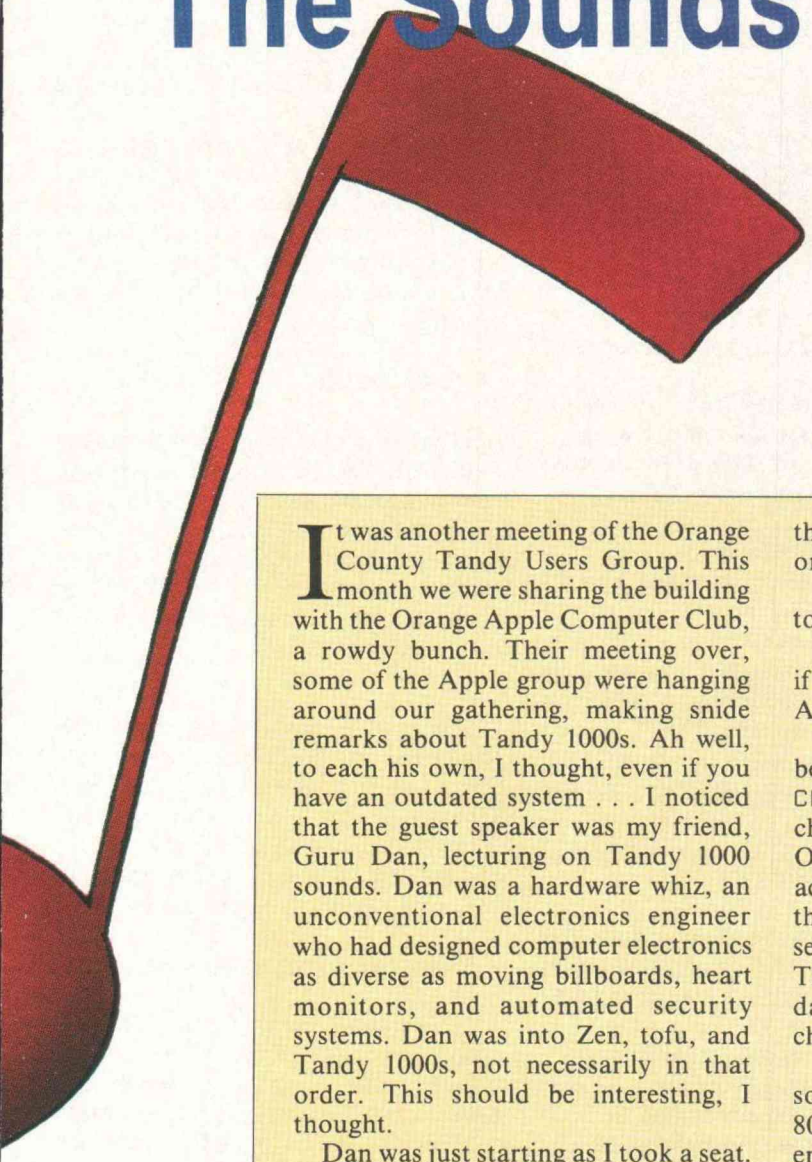


The Sounds of Science



By Bill Barden, Jr.
PCM Contributing Editor

It was another meeting of the Orange County Tandy Users Group. This month we were sharing the building with the Orange Apple Computer Club, a rowdy bunch. Their meeting over, some of the Apple group were hanging around our gathering, making snide remarks about Tandy 1000s. Ah well, to each his own, I thought, even if you have an outdated system . . . I noticed that the guest speaker was my friend, Guru Dan, lecturing on Tandy 1000 sounds. Dan was a hardware whiz, an unconventional electronics engineer who had designed computer electronics as diverse as moving billboards, heart monitors, and automated security systems. Dan was into Zen, tofu, and Tandy 1000s, not necessarily in that order. This should be interesting, I thought.

Dan was just starting as I took a seat.

"There are three ways in BASIC to produce sounds on the 1000," Dan stated.

Is That Your Beeping Computer?

"The simplest sound that the Tandy 1000 can make is a beep." So saying, he entered BEEP after the "OK" prompt in BASIC and the system made a quarter-second beep sound. "BEEP is used to signal an error condition or to attract the attention of an operator," he went on.

"Does anybody know of another way to get a beep?" Dan asked.

"Yeah, your Tandy 1000s will beep if you pull their plugs," said one of the Apple hecklers.

Unperturbed, Dan continued — "A beep is also produced by printing a CHR$(7) character. The CHR$(7) character is a BEL, standing for bell. On the old teletypewriters there was an actual bell that could be rung to attract the operator's attention — a hot wire service story rang the bell several times! The BEL code is a leftover from those days of wooden men and iron machines," Dan lamented.

"Forget about BEEP for music or sounds — about all it does it make an 800-Hertz sound," Dan advised. "Everybody know what a Hertz is?" he asked. Seeing some raised eyebrows, Dan continued. "A Hertz is just a measure of the *frequency* of a sound, Here's the way a pure audio tone looks," Dan stated. He drew a sine wave on the blackboard (see Figure 1). "This sine wave is 800 *cycles-per-second*, or 800 Hertz. A cycle is the time it takes to get back to the starting point. The sine wave represents air pressure or voltage fed to a loudspeaker to produce that air pressure."

(William Barden, Jr., is a master communicator in a field in which he is one of the few recognized experts — microcomputers. A prolific author of more than 27 books and handbooks on computers and computer programming, Bill also has authored several instructional software projects for Tandy/Radio Shack.)

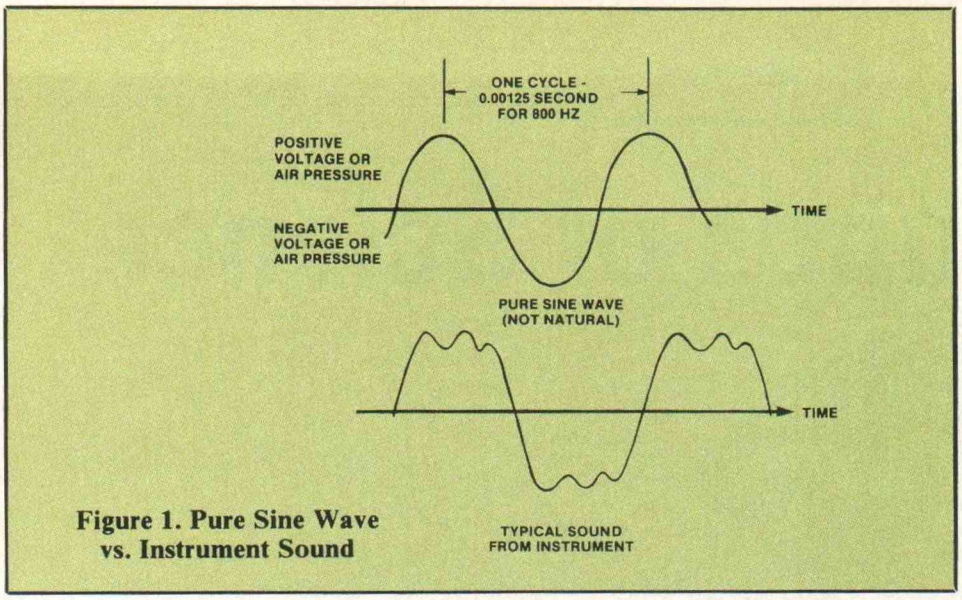


Figure 1. Pure Sine Wave vs. Instrument Sound

"Of course, most sounds produced aren't pure sine waves," Dan went on. "Most sounds look like the second waveform — lots of frequencies all superimposed on one another. That's what gives a different sound to a C played on a piano keyboard compared to a C played on a detuned samisen." Dan's Far Eastern meditation was surfacing again, I thought. Next, he'll be talking about satori and sushi.

"The problem with computers is that it's not too easy to produce a sine wave. However, it *is* easy to generate a *square wave*," Dan declared, drawing another figure on the blackboard (Figure 2). "Square waves are generated by turning a voltage off and on. What we're hearing on the 800-Hertz beep is a square wave," Dan continued. "Believe it or not, square waves are made up of a lot of superimposed *odd harmonics*. Here's a diagram I produced (Figure 3) showing how harmonic frequencies add together to make up the 800-Hertz square wave. Of course, those harmonics are of lower volume than the main frequency, but they are there, and make a square wave of 800 Hertz sound different from a sine wave."

Dan Has SOUND Ideas

"The second way to make sounds with a Tandy 1000 in BASIC is to use SOUND," Dan went on.

"Each SOUND statement produces one tone. The SOUND action is the same on the 1000 as it is on the IBM PC*jr*. The SOUND statement looks like this," Dan said, illustrating the syntax on the blackboard:

```
SOUND freq,duration
```

"*Freq* is a numeric expression in the range of 109 to 32767 and *duration* is .0015 through 2978. The *freq* parameter sets the frequency of the tone played — the *freq* value is the actual frequency produced. Of course, you won't be able to hear tones much over 6000 or 7000 Hertz due to the limitations of the system. The neat thing about SOUND is that you can play a lot more frequencies than just musical notes.

"The duration parameter controls the length of the tone in clock ticks. Everbody know what a clock tick is?" Dan asked.

"Do they hang from binary trees and drop onto you as you walk by?" an Apple SIG member shouted.

I noticed a twitch in Dan's lower left eyelid.

"Each clock tick is generated from an internal clock in the system; 18.2 clock ticks occur every minute, making each clock tick 0.0549 seconds long. A one-second duration middle C would be sounded by (Dan wrote on the board):

```
SOUND 262,18
```

"Here's a program that will sweep the tones from low to high," Dan offered, passing out another sheet (See Listing 1). "You know, it's a shame that Tandy didn't put in the other SOUND options that are in the PC*jr* — they allow you to change the volume and to play up to three voices.

"But wait, I have a surprise for you. Tandy *did* include those parameters," Dan said with a twinkle in his eye. "They're in the BASIC, but just not documented — at least not in my manual. Here's the proper format," he said, writing on the board again:

```
SOUND freq,duration,volume,voice
```

"The *volume* parameter is a value or expression in the range of 0 to 15. The default value appears to be 8. The greater the value, the louder the volume.

"*Voice* is 0, 1, or 2 for the *voice*

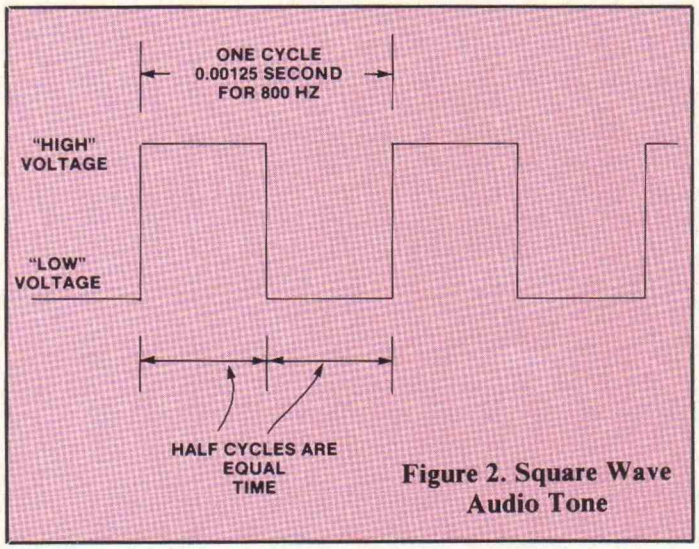


Figure 2. Square Wave Audio Tone

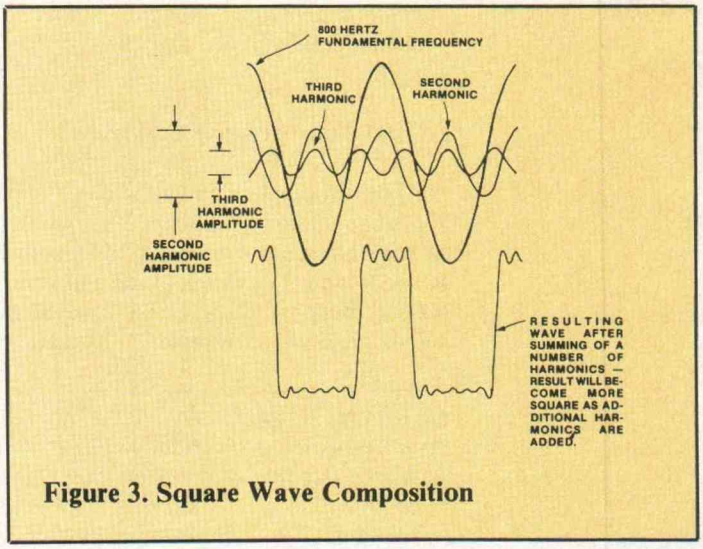


Figure 3. Square Wave Composition

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(Listing 1)

```
100 ' Low to High Sweep Using SOUND
110 SOUND ON
120 FOR FREQ=100 TO 4000 STEP 10
130 SOUND FREQ,1,15
135 FOR I=1 TO 100: NEXT I
140 NEXT FREQ
```

number. The Tandy 1000 allows three voices at one time. Everybody know about voices?" Dan queried. Eyebrows went up. "I guess voice comes from several singers singing the same melody or even different melodies, like a fugue. We'll talk about how that's done in a moment. But before I go on I should mention that a SOUND ON or SOUND OFF routes the sound to the audio output jack on back of the 1000. Be sure to do a SOUND ON before using an external amplifier.

"OK, any questions so far?" Dan asked.

"Yeah, when are you going to talk about a *real* machine?" growled an Apple heckler.

Dan's other eyelid twitched this time, but he regained his composure after a brief moment and went on.

Background Music Isn't Necessarily Muzak

"The next thing I want to talk about is music background and foreground. On some computers, the computer controls the sound generation in software — it has to be executing a machine language program continually to produce the sound. In the 1000, though, you can set a tone and go off and do some other processing. Microsoft calls this music *background*. Here's an example." Dan handed out another sheet with a listing on it, printed on the back of brochures for "Yoshi's Kut-Rate Karate School." Humm, looked like Dan had been doing more than meditating. On the listing I found:

```
100 SOUND ON
110 SOUND 600,100
120 PRINT "At statement 120"
```

"Let me run this simple program for you." Dan loaded and ran the program on the 1000. The tone sounded, but almost immediately, while the tone was still present, "At statement 120" appeared on the screen. "This is music background — notice how the sound started and then BASIC continued? Music background is the default for SOUND.

"OK, we've got one more statement to look at and then we'll get into some more interesting topics."

Playing Music on the 1000

"PLAY is the most powerful command in 1000 BASIC for musical sounds. It works like the DRAW command. Basically, you PLAY a string made up of one-letter codes. The codes represent notes to be played, octave settings, length of notes, rests, tempo settings, and note lengths.

"Here's a typical PLAY for 'The Yellow Rose of Texas'." Dan loaded and started this statement:

```
100 PLAY "t250o3p1gfegggag
2feg>cde2.<gg>eeeed2c<b>
cded2<gfegggaggfeg>cde
2.<gg>ffffedcc<g>edc2"
```

"Let's just briefly go through commands. I've prepared a 'crib sheet' for you." Dan passed out the sheets to the audience. On the reverse side was a menu from "Au Naturel," a local health food restaurant. Dan, Dan, I thought, always proselytizing.

"First, notes. Within the string, 'A', 'B', 'C', 'D', 'E', 'F' or 'G' play the corresponding notes in the current octave. Sharps are indicated by following the note value with a # or plus sign (+). Flats are indicated by a following minus sign. An alternate way to specifying note values is with the letter 'N' followed by zero to 84. The numeric value corresponds to the 12 notes of seven octaves. Values of one through 12 are 'C', 'D', 'E', 'F', 'G', 'A' and 'B' of the first octave. A value of zero is a rest.

"Seven octaves can be specified (zero through six). The default octave is octave four. Within the PLAY string, the letter 'O' followed by the digit 0 through 6 specifies the octave. O5, for example, is octave five. However, a word of warning — octave zero will not produce the proper tones — the sound generator chip is not capable of producing the low frequencies in the first octave.

"The character > within a string means "raise one octave" and the character < means lower one octave. This is usually followed by a note value. A <C, for example, means "play C one octave lower than the current octave. Once the octave is changed, it remains changed.

"Within the string, an 'L' character followed by a value of one through 64 sets the note duration to 1/n. For example, L8 sets the note duration to an eighth note, L16 sets sixteenth notes, and so forth. This note duration remains in force until a new 'L' definition. If you want to play a note of a specific duration only once, and retain the current duration, the note character is followed by a duration value. A4, for example, plays a quarter note 'A' in the current octave.

"A dot after a note increases the length of the note by one-half. A second dot adds another one-quarter, a third dot adds another one-eighth, and so forth.

"The 'P' character in a string followed by a value from one through 64 causes a rest of duration 1/n in the same way the note length is calculated. A P4, for example, is a quarter rest. Rests may also be dotted.

"A 'T' character in the string followed by a value of 32 through 255 sets the tempo in quarter notes in a minute. The default is a tempo of 120 counts per minute.

"The characters MF or MB set either music foreground or music background as we were discussing before.

"The characters MN, ML, or MS set the note type; normal, legato (full length), or staccato (3/4 length). The default note type is normal, or 7/8th of the length value.

"An 'X' character, followed by a string name, executes the string. The contents of the specified string is played just as if it were 'in line' in the main string.

"The 'V' character may be used to set the volume of the song. A SOUND ON must have been executed sometime before. The 'V' is followed by a value of zero through 15, signifying a low to high volume."

Hearing Voices

"Now here's a neat part: In the 1000, you can PLAY one, two, or three voices simultaneously. A SOUND ON must have been executed prior to the PLAY. For multiple voices, set music background by MB and then execute a PLAY of two or three strings: PLAY A$,B$ plays two voices, while PLAY A$,B$,C$ plays three voices."

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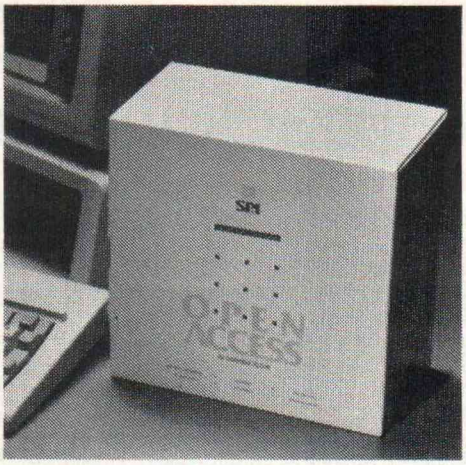

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By this time the listeners were groaning. "I know, there's a lot to remember, but just try a few strings when you get home. It's fairly easy to play some fancy songs.

"Just a few more notes: The numeric values in the commands above may also be changed to variables by using an equal sign, the variable name, and a semicolon. If variable 'K' is 4, for example, O=K will set the octave to octave four. The equal sign and semicolon delimit the variable name to differentiate it from a legitimate PLAY command.

"Another trick: This form of PLAY(*n*) returns the number of notes currently in the music buffer, or zero if the program is in the foreground mode. It's used to test how close to the end of a song the program is or to test the point at which to add another voice. The format of this function is:

```
TEST=PLAY(0)
```

TEST can be any numeric variable and (0) is a dummy variable."

Tandy Sounds — More Than PLAY

Dan put down the sheet and looked at the audience. "All in all, the PLAY command is great. It's a far cry from what we could do on a Model I back in '78. Still, would you believe that you can do a whole lot more in BASIC? I'll show you what I mean." Dan loaded another program and started it. The 1000 sounded a gunshot, made a sound like a falling bomb with an explosion at the end, gave a wolf whistle, and then played a piece that sounded like a harpsichord. There was a murmur of interest among the audience.

"You must need a music board to do that," somebody said.

"No, not at all. Everything you heard was done in BASIC. I'll show you how, but first you've got to suffer through some hardware descriptions." There were more groans from the audience.

"I'll make it as painless as possible, I promise," Dan declared.

"Tell us about using Tandy equipment as boat anchors," came a belligerent shout from the Apple goons. This time, *both* of Dan's eyelids twitched, and it took him a little longer to recover, but he went on.

"In researching sound generation on the 1000, I knew that the Tandy 1000 emulated the PC*jr*. That was helpful, because there just wasn't any technical information coming out of Fort Worth about the 1000, although a technical manual is listed in the computer catalog."

The Complex Sound Generator Chip

"The PC*jr* uses a Texas Instruments SN76496N complex sound generator chip. Sure enough, when I opened up the 1000, there was the same chip. The next problem was getting a spec on the 496N. There's a pretty good spec, believe it or not, in the *IBM PCjr Technical Manual*, but the manual costs $60. I also wanted to get the original spec, though, because publication departments have a way of mixing up the facts. I finally located a copy of a copy — the spec is hard to get from TI, but try them first. I'd also recommend getting their spec on the SN76489N, another sound generator chip. It has some good examples of various types of sound generation — bird calls, jets, and so forth.

"Anyway, let me describe the 496N to you, since you'll need to know about it to make some neat sounds. It has four channels of sound, three that produce square waves and one that produces white noise. Everybody know what white noise is?" Heads shook no.

"White noise sounds like an AM radio tuned between stations. It's a hissing sound that actually is made up of many random frequencies at the same time. White noise is present in gunshots, jet engine noise, crowd sounds, and even in the human voice.

"The noise channel can be programmed for several different types of white noise. I'll show you how later. The other three channels are the main tone channels. They can be programmed to produce a a square wave tone from one that's too low to hear to one that's too high to hear. Both extremes can't be passed through the 1000, by the way — it's really not a high-fidelity audio system.

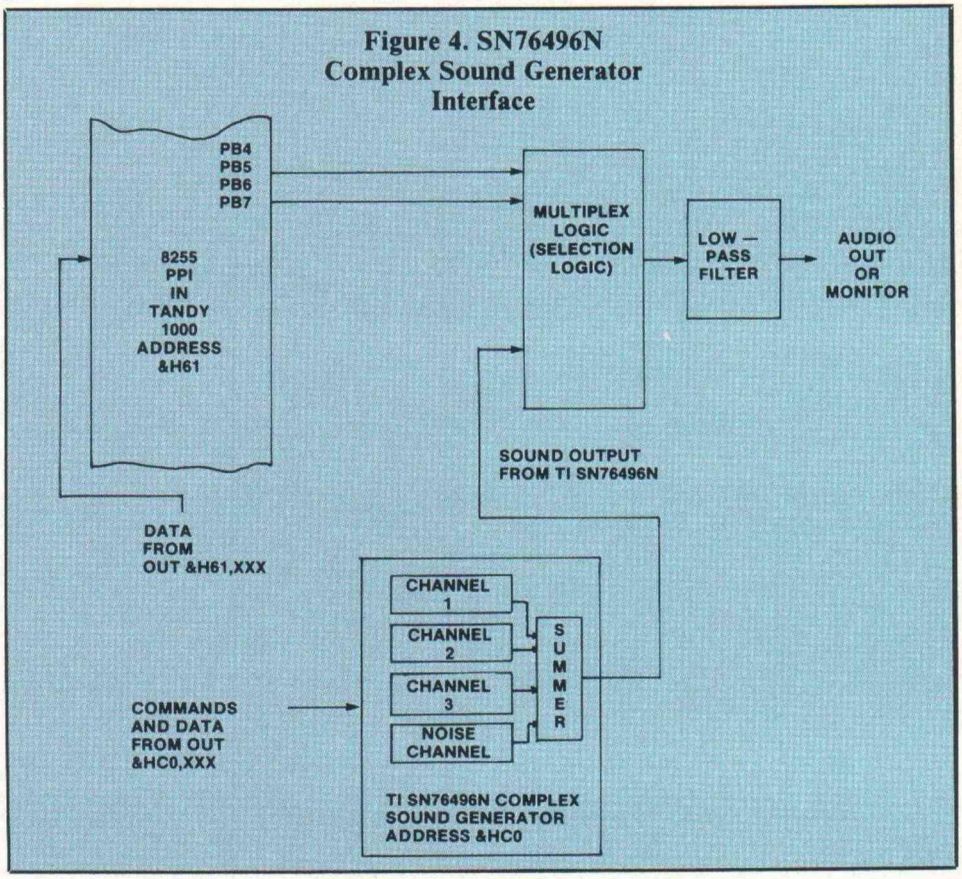
"Not only can you get different *pitches* for the channels, you can program different *volumes*. Actually, TI uses an *attenuator* for the channels. That's just a fancy way of saying that the sounds are reduced in volume. The volume for any channel can vary in about 15 steps from loud to no sound, and that includes the white noise channel too.

"Once a tone or white noise and a volume are programmed into the chip, they'll remain until a new tone is defined. The chip will sit there, cranking out the tones and you're free to do other things in BASIC, assembly language or whatever.

"All channels feed into a common output channel, so you can get a mixture of three different tones at three different volumes and white noise at a preset volume.

"All well and good, you say, but how do you program this critter? I have a simplified diagram here." He passed out another sheet of paper (see Figure 4).

Figure 4. SN76496N Complex Sound Generator Interface



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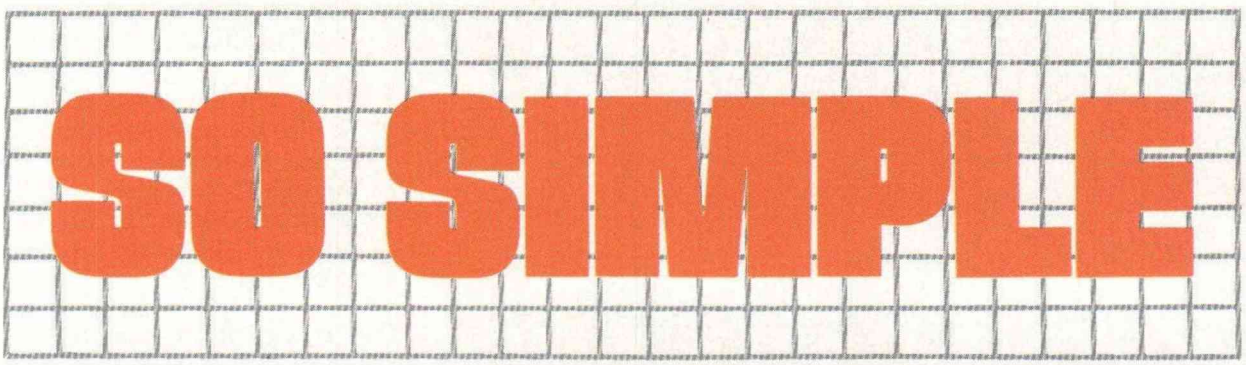


"The 496N is controlled by something called a PPI, a peripheral interface adapter. There's no magic in this — it's just three eight-bit memory cells that hold control bits. Two of the bits control the routing of the sound. To route the output of the 496N to the audio output, you must execute an OUT &H61,&H6C.

"Note: If sound and *graphics* are to be run together, use EH68 in place of the EH6C value.

"The OUT command, by the way, is just BASIC's means for addressing an input/output channel. It happens that this input/output channel is dedicated to the control bits shown in the figure. This addresses the PPI at address &H61 and routes the output of the 496N to the audio channel.

"Now you have the sound routed, but what about programming the channels? Well, there's another address involved, the address of the SN76496N chip. It's address is &HC0. Programming the 496N means doing another OUT, but this time with an address of &HC0:

```
OUT &HC0,XXX
```

SN76496N Registers

"Now comes the more difficult part. There are eight registers within the SN76496N. They are" (Dan started writing on the board):

Register 0 Tone 1 Frequency
Register 1 Tone 1 Attenuation (Volume)
Register 2 Tone 2 Frequency
Register 3 Tone 2 Attenuation (Volume)
Register 4 Tone 3 Frequency
Register 5 Tone 3 Attenuation (Volume)
Register 6 Noise Control
Register 7 Noise Attenuation (Volume)

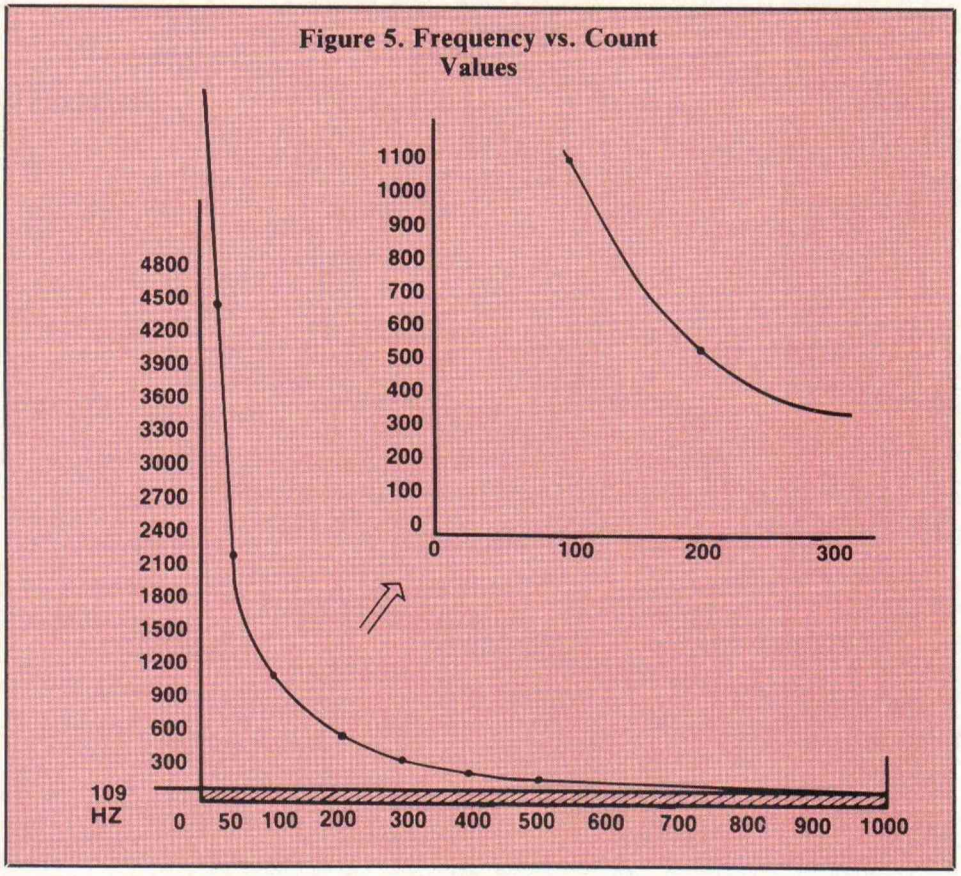
"To set the tone frequency, you must send 10 bits of data to a frequency register. The ten bits range from one (0000000001) to 1023 (1111111111) and set a count value. This count value is counted down to make up the square wave frequency. *The larger the value, the lower the frequency*, by the way. The actual frequency sounded, for those of you who aren't afraid of formulas is:

f=3.579E6/(32*COUNT)

"The 3.579 megaHertz value is the clock frequency of the 496N chip. It's the same frequency as a television color burst crystal, a commonly used clock frequency for these types of things. The lowest frequency that can be set is 109 Hertz (COUNT=1023)."

"Here, I've drawn a chart to show you how the frequency changes with the COUNT." Dan passed out still another sheet (Figure 5).

Figure 5. Frequency vs. Count Values



"Follow this closely, now, folks," Dan warned.

" To program the frequency, do this:

1) Get the COUNT value from the formula or chart.
2) Divide the COUNT value by 16 and save the quotient as VALUE2.
3) Multiply VALUE2 by 16 and subtract this from COUNT. The result is VALUE1.
4) Do an OUT &HC0,128+REG*16+VALUE1.
5) Do an OUT &HC0,VALUE2.

"The REG value is the register number for the tone — zero, two or four. Look, here's an example. I want a frequency of 800 Hertz. From the formula:

800=3.579E6/(32*COUNT)
COUNT=3.579E6/(32*800)=
3579000/25600=139.8

"I'll round off to 140. Dividing 140 by 16 gives a quotient of 140/16=8 for VALUE2. Multiplying VALUE2 by 16 and subtracting from COUNT is 140-8*16=140-128=12 for VALUE1. The OUTs are:

```
OUT &HC0,128+0*16+12
OUT &HC0,8
```

"The actual format of the frequency bytes is shown in this sheet, for those of you that are into binary." Dan passed out another sheet. "However, if you stick with the procedure above, you'll be able to set the frequency with a little bit of work. This sheet (Figure 6) also shows the formats for the other registers, by the way."

"Now you have the tone frequency set. At this point the you may or may not have sound, depending upon what is in the attenuator register for the tone channel. To set the attenuator, do this OUT:

```
OUT &HC0,128+REG*16+ATTEN
```

"In this out, REG is one, three, or five for the tone channels and ATTEN is an attenuator value from zero through 15. Remember, the greater the attenuator value, the less volume with the sound. To set the loudest sound on channel zero, do:

```
OUT &HC0,128+0*16+0
```
(no attentuation)

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You see the disk directory instantly; works just like the main menu

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Database – The portable disk drive stores your mailing list, inventory items, part #s and descriptions or any other data that you need to recall.

358K on a diskette

Invoice (purchase order) – At the touch of a button you can print out your sequentially numbered, professionally done invoices. This is truly professional invoicing capability.

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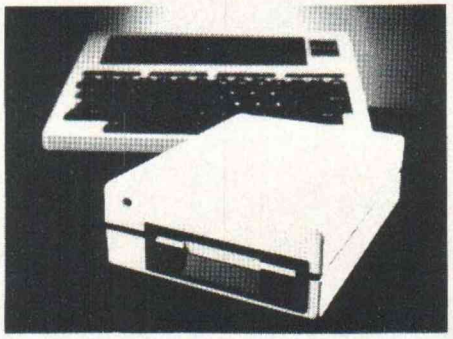

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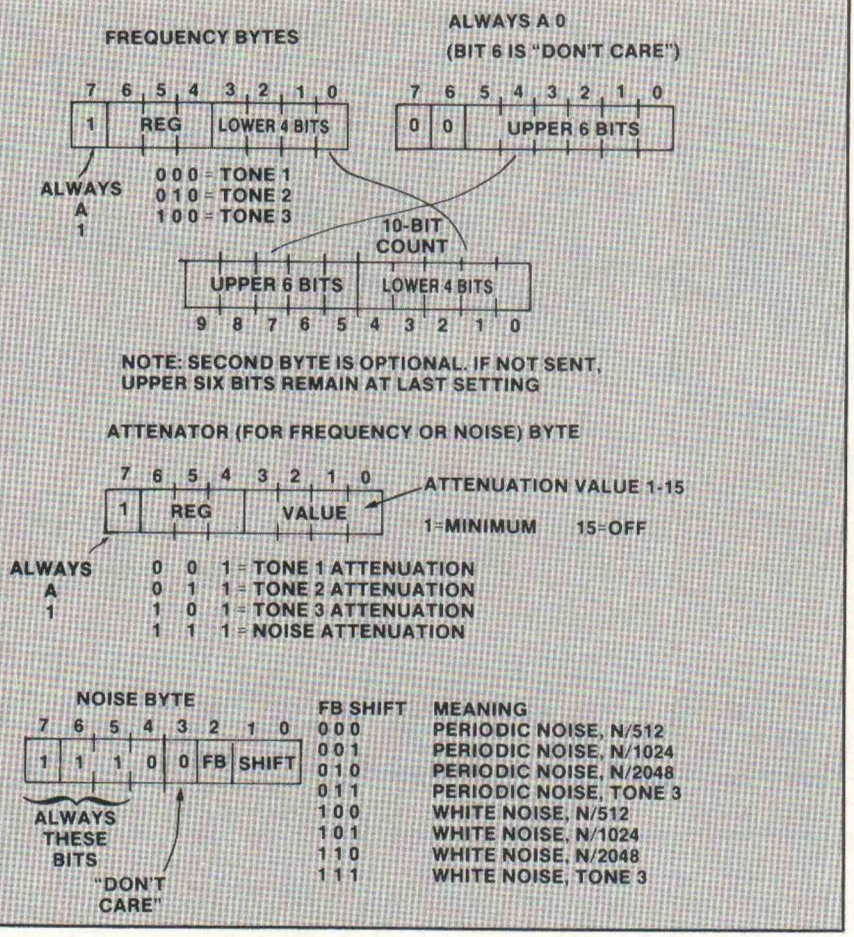
Figure 6. SN76496N Byte Formats



"After you've done all of this, you should hear a sound. As a practice, try this program. It allows you to set tones on any channel with any loudness. You can set from one to three tones at once, too. (See Listing 2).

"Now you know how to set the tones and volume. Any questions?"

"Dan, how often can you change the settings?" asked one of the audience.

"The hardware allows you to update about every 8.9 microseconds, or about 112,400 times per second for each OUT. That's faster than you can execute each BASIC OUT, although you could go that fast in assembly language. That's probably more than enough when you consider that musical notes take on the order of tenths of seconds on up! Anytime you want to change the tones, just execute another set of OUTs for the frequency and attenuation."

"Question! Why are Tandy 1000 owners such wimps?" shouted a 6-foot 2-inch, 300-pound Apple nerd. Dan's eyelids twitched and his right hand made an involuntary chopping gesture, but he continued.

"Now, on to the noise channel. The attenuation for the noise channel works the same way as a tone channel:

```
OUT &HC0,128+7*16+ATTEN
```

"ATTEN is a value from 1 to 15.

"The noise generation byte is different, though. It's on the last sheet I gave you (Figure 6). The FB bit sets either "periodic" (FB=0) or 'white' noise (FB=1). White noise, we've seen, but periodic noise is different. It's a tone. The shift bits alter the noise. Setting the bits to 11 (3 decimal) routes the output of tone channel three to control the noise. The best way I can illustrate what happens is to let you listen. This program will let you input different combinations for the noise channel." Dan ran another program. (See Listing 3.)

"Note that the OUT for the noise channel is:

```
OUT &HC0,128+6*16+FB*4+SHIFT
```

"FB is 0 or 1 and SHIFT is 0, 1, 2, or 3.

"Like the tone channels, the noise channel continuously outputs noise until another set of control bytes are sent by an OUT. To turn off the noise, send a 15 to the noise attenuator register:

```
OUT &HC0,128+7*16+15
```

Beautiful Noise

"Ready to make some noises?" Dan passed out a raft of additional listings and figures. "Let's try a gunshot first. A gunshot is white noise that fades away rapidly. The program here (Listing 4) sets up the noise channel for white noise and then rapidly attenuates the noise by doing a quick series of attenuation outputs from 0 through 15.

"By using random noise lengths and increasing and then diminishing noise (Listing 5), you can simulate surf on an oceanside.

"Here's a bird song program (Listing 6) that uses a random number of chirps and a random time between chirps. My wife heard it in another part of the house and thought that it was a real bird!"

(Listing 2)

```
100 ' Output three tones with attenuation
101 CLS
110 OUT &H61,&H6C
120 INPUT "Count, Attenuation: ",COUNT1,ATTEN1
130 INPUT "Count, Attenuation: ",COUNT2,ATTEN2
140 INPUT "Count, Attenuation: ",COUNT3,ATTEN3
150 OUT &HC0,&H80+(COUNT1 AND &HF)
160 OUT &HC0,INT(COUNT1/16)
170 OUT &HC0,&H90+ATTEN1
180 OUT &HC0,&HA0+(COUNT2 AND &HF)
190 OUT &HC0,INT(COUNT2/16)
200 OUT &HC0,&HB0+ATTEN2
210 OUT &HC0,&HC0+(COUNT3 AND &HF)
220 OUT &HC0,INT(COUNT3/16)
230 OUT &HC0,&HD0+ATTEN3
240 GOTO 120
```

Envelope Generation

"And now to show you some real power! You're probably wondering how I got that harpsichord sound. The secret of this is 'envelope' generation. Let me tell you what I mean.

"The envelope of a musical or other sound defines the characteristics of the sound. A piano note fades away far less rapidly than a drum beat (see Figure 7). Synthesizers use envelope generation and define the envelope by 'ADSR' — attack, decay, sustain, and release. (See Figure 8.) You can generate your own envelope by changing the attenuation of a tone."

"The program shows three types of notes. The first is a harpsichord-like note — its envelope looks like a ramp down. The second note is a ramp up — you'll never hear that in a musical instrument! It's like a tape recorder played in reverse. The third is a vibrato — load, soft, loud, soft. You can make up your own at will." (See Listing 7 and Figure 9.)

"Get off the stage, turkey . . . " came a voice from the Apple corps.

Dan turned toward the heckler and shouted, "And now for one final thing . . . "

So saying, Dan did a double forward flip and landed directly in front of the group of Apple hecklers, crouched in a karate stance. Two of the hecklers immediately went into their *own* karate stance and brought out vicious-looking weapons fashioned from Apple motherboards, obviously pirated versions from Taiwan. In a matter of seconds — and several well-placed karate chops — it was all over. The 300 pounder went first. The hecklers slunk off to the remanants of their meeting, nursing their bruised bodies.

"Congratulations, Dan. You really cleaned them up," I said, rushing up.

Dan got a reflective look in his eyes. "What is the sound of one Tandy 1000 crashing?" he asked, gave a short bow, and walked off to a standing ovation. □

(Listing 3)

```
100 ' Output noise channel, maximum volume
110 CLS
120 OUT &H61,&H6C
130 INPUT "FB(0 or 1),SHIFT(0-3): ",FB,SHIFT
140 OUT &HC0,&HE0+FB*4+SHIFT
150 OUT &HC0,&HF1
160 GOTO 130
```

(Listing 4)

```
100 ' Gunshot. Change length by FOR J=1 TO VALUE.
110 CLS
120 OUT &H61,&H6C
130 OUT &HC0,&HE0+1*4+0
140 FOR I=1 TO 15
150 OUT &HC0,&HF0+I
160 FOR J=1 TO 12: NEXT J
170 NEXT I
```

(Listing 5)

```
100 ' Surf
110 CLS
120 OUT &H61,&H6C
130 OUT &HC0,&HE0+1*4+0
140 FOR I=10 TO 1 STEP -1
150 OUT &HC0,&HF0+I
160 FOR J=1 TO 500*RND(1): NEXT J
170 NEXT I
180 FOR I=1 TO 10
190 OUT &HC0,&HF0+I
200 FOR J=1 TO 500*RND(1): NEXT J
210 NEXT I
220 FOR J=1 TO 1000*RND(1): NEXT J
230 GOTO 140
```

(Listing 6)

```
100 ' Bird song
110 OUT &H61,&H6C
120 FOR J=1 TO 30*RND(1)
130 FOR I=1 TO 15
140 OUT &HC0,(128+I)
150 OUT &HC0,1
160 NEXT I
170 NEXT J
180 OUT &HC0,&H9F: FOR K=1 TO 1000*RND(1): NEXT K: OUT &HC0,&H91
190 GOTO 120
```

(Listing 7)

```
100 ' Output bell sound, one channel
110 CLS
120 OUT &H61,&H6C
130 INPUT "Count,duration: ",COUNT,K
140 OUT &HC0,&H80+(COUNT AND &HF)
150 OUT &HC0,INT(COUNT/16)
160 FOR I=1 TO 15
170 OUT &HC0,&H90+I
180 FOR J=1 TO K: NEXT J
190 NEXT I
200 GOTO 130
210 ' Output 11eb sound, one channel
220 CLS
230 OUT &H61,&H6C
240 INPUT "Count,duration: ",COUNT,K
250 OUT &HC0,&H80+(COUNT AND &HF)
260 OUT &HC0,INT(COUNT/16)
270 FOR I=15 TO 1 STEP -1
280 OUT &HC0,&H90+I
290 FOR J=1 TO K: NEXT J
300 NEXT I
310 OUT &HC0,&H9F
320 GOTO 240
330 ' Output vibrato, one channel
340 CLS
350 OUT &H61,&H6C
360 INPUT "Count,duration: ",COUNT,K
370 OUT &HC0,&H80+(COUNT AND &HF)
380 OUT &HC0,INT(COUNT/16)
390 FOR I=1 TO 5
400 OUT &HC0,&H90+I
410 FOR J=1 TO K: NEXT J
420 NEXT I
430 FOR I=5 TO 1 STEP -1
440 OUT &HC0,&H90+I
450 FOR J=1 TO K: NEXT J
460 NEXT I
470 FOR I=1 TO 5
480 OUT &HC0,&H90+I
490 FOR J=1 TO K: NEXT J
500 NEXT I
510 FOR I=5 TO 1 STEP -1
520 OUT &HC0,&H90+I
530 FOR J=1 TO K: NEXT J
540 NEXT I
550 OUT &HC0,&H9F
560 GOTO 360
```

Figure 7. Envelops of Musical Sounds

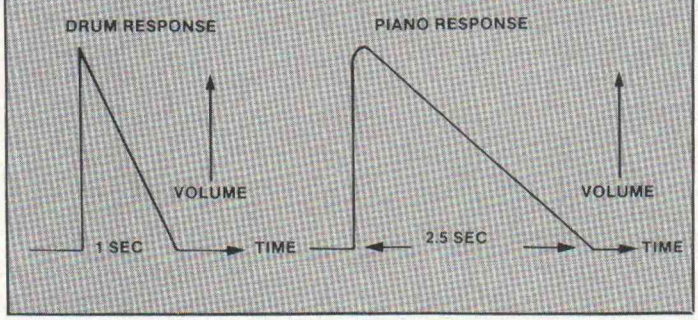


Figure 8. Synthesizer Envelopes vs. Conventional Envelopes

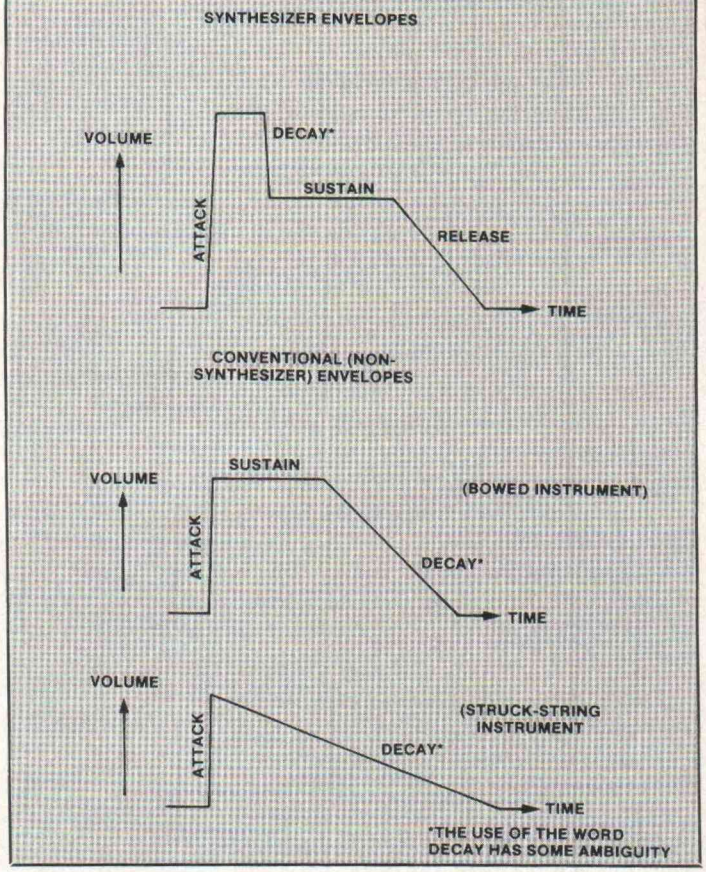
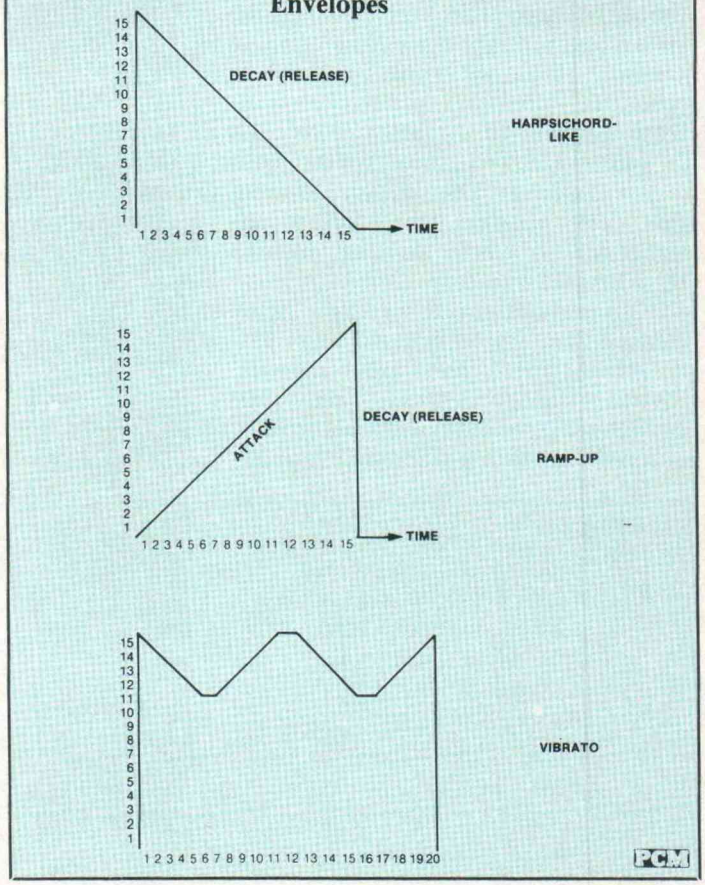


Figure 9. Computer Envelopes



Add Search and Replace Power to Your Portable's Text-Handling Functions

By Richard Ramella

Vladimir Nabokov, who is best known for his novel *Lolita*, once wrote a book whose main character is named Cincinnatus. That name is a tangle of fingers to type.

Nabokov made his writing job easier by abbreviating the name as *C.* in the manuscript, while instructing the typesetter to spell it out in every occurrence.

I know this is so because I saw the manuscript of *Invitation to a Beheading* at the Library of Congress.

Many word processing systems include a capability that does the same job for the user that the typesetter did for Nabokov.

It's called "search and replace."

The portable computer has a string search capability while in the text mode, but doesn't automatically replace anything. It's up to the user to tap numerous key combinations, erase and retype. This is an onerous task.

With my brief BASIC listing called Search-and-Replace, your portable now is able to search a document and replace one string of characters with another — true search-and-replace capability.

I wrote this utility program when an editor asked that I change the name of a character in one of my books. An otherwise four-hour job took 20 minutes, and I knew the computer was more precise in its search than I could have been.

I've used *Search-and-Replace* in many ways. Every month I have the job of preparing for publication a list which contains a boring abundance of the characters *Mr. and Mrs.* In preparation I type *qz* instead of *Mr. and Mrs.* and run the text file through *Search-and-Replace*. I yawn once or twice and the work is complete.

I've also used the program to correct misspelled names throughout a document.

Let's test the program.

First, type the program into your computer and save it as a BASIC file. I suggest you also `CSAVE` it to tape.

Create a text file named `TEST`. In it, type this sentence: *It did not pass the test.*

Run *Search-and-Replace*. In answer to the prompt `Name of file to search?` type "TEST" and ENTER.

In answer to the prompt `Sought string?` type "did not" and press ENTER.

Answer the prompt `Replace string?` by typing "did" and pressing ENTER.

The work is automated from this point. When the change is made, the computer will beep 10 times and flash this screen message: `FINISHED.`

Go to the text file named *TEST*. The words there should now read `It did pass the test.` The word *did* replaced *did not*. If the file had numerous occurrences of the characters *did not*, all would be replaced by the characters *did*.

To avoid memory miscues, you should know just a bit about the internal workings of the program. It feeds characters out of the file and, with appropriate changes, sends them into a second text file called *NEW*. This isn't evident because the old version is killed and the new one given the old one's name after the work is done. What is meaningful is that the old file should not occupy more than half the available free bytes of the system. If it does, an OM (out of memory) error can occur when memory is filled.

If you want to run very long files through *Search-and-Replace*, I suggest you send the new material to a cassette file. This method calls for simple program changes. To make them, just type these lines into the program:

(Richard Ramella is a former newspaper editor who now works as a writer for a California hospital. He has published more than 200 computer programs.)

```
180 OPEN "CAS:"+F FOR OUTPUT AS
2
230 CLOSE 1: CLOSE 2: PRINT
"FINISHED"
```

When using the program with these changes, position a fresh cassette tape in the tape recorder before running the program. Depress the *Record-Play* buttons together. On completion, the changes will be in a taped text file with the same name as the original file, and the original file will remain in the system.

A Couple Caveats

In text mode, the string search command will find any combination of upper- and lowercase characters spelling out a sought string. However, the program *Search-and-Replace* makes a literal search. If you tell it to seek out *X-ray*, it will do so while ignoring such variants as *x-ray* and *X-Ray*.

Take care when seeking small words. For example, if you ask the program to replace *rich* with *opulent*, it would change the sentence *Richard isn't rich* to *Opulentard isn't opulent*. The way around this is to hit the spacebar before and after typing the brief word string you're seeking. □

PCM BAR CODED LISTING

The listing:

```
1ØØ REM * Search and Replace * TRS-8Ø Mo
del 1ØØ/2ØØ
11Ø CLS: MAXFILES=2: CLEAR 75Ø
12Ø DEFSTR F,M,N,R,S,V: N="NEW.DO"
13Ø INPUT "Name of file to search";F
14Ø F1=F+".DO": INPUT "Sought string";S
15Ø INPUT "Replace string";R
16Ø CLS: PRINT "Working..."
17Ø OPEN F+".DO" FOR INPUT AS 1
18Ø OPEN N FOR OUTPUT AS 2
19Ø V=INPUT$(1,1):V1=V1+V:P=INSTR(V1,S)
2ØØ IF P>Ø THEN GOSUB 25Ø: GOTO 19Ø
21Ø IF EOF(1) OR LEN(V1)>254 THEN PRINT
#2,V1;: V1=""
22Ø IF EOF(1) THEN 23Ø ELSE 19Ø
23Ø KILL F1: NAME "NEW.DO" AS F1: PRINT
"FINISHED."
24Ø FOR X=1 TO 1Ø: BEEP: NEXT: END
25Ø PRINT #2,LEFT$(V1,P-1);
26Ø PRINT #2,R;: V1="": RETURN
27Ø END
```

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A BASIC Text Formatter For Your Tandy 1000, 1200, 2000

By John Melski, M.D.

PRINT.BAS is a program that prints standard ASCII text files. The program supports a full spectrum of font and format controls, including headers, footers and pagination. It allows documents to be embedded within other documents. It provides for multiple copies and inspection of embedded variables from standard data files. It also provides for input of inbedded variables from the keyboard at the time of printing.

Also supported by PRINT.BAS is a feature not found in any commercial word processor — sequential renumbering of reference citations with automatic sorting of reference lists. This means that you can cut and paste your text and add and delete references without concern for the tedium of renumbering or sorting your references. The ability to conveniently handle references makes PRINT.BAS especially valuable to writers of published literature where sequential numbering and sorted listing of references are required.

The initial inspiration for PRINT.BAS was *Telecommuter* — a word processing and telecommunications package developed by Sigea Systems, Inc. PRINT.BAS expands upon the print features of *Telecommuter's* Text Editor. Since PRINT.BAS is written in BASIC, you can customize your printing tasks and completely interface your word processor with your printer. The program looks for embedded characters used by *Telecommuter* and control characters used by an EPSON FX-80 printer. I will note where the code would have to be changed for another word processor and/or printer.

(Dr. John Melski was affiliated with the Computer Medicine Laboratory of the Brigham/Beth Israel Medical Group in Boston for almost nine years where he worked with research databases. Since 1983, he has worked as a dermatologist for the Marshfield Clinic in Wisconsin and pursues microcomputing as an avocation.)

Embedded Commands

Embedded commands allow you to control the margins and appearance of your printed text. Embedded commands appear in your text file, but they will not appear in your printed document.

Each embedded command must be on a line by itself. A command consists of a period followed by two letters. Embedded commands are also known as "dot" commands. Some commands are followed by one or more additional items that are called "arguments."

You may put a comment after a command with no arguments, or, at most, a single argument. This is a good way to identify the purpose of a group of commands.

Commands may be entered in upper- or lowercase.

Here are some sample embedded commands:

```
.lm 4        The first command is followed by this comment
.sk 3
.ti 1,3,c,CHAPTER ONE
```

You will soon learn what these commands mean. Any guesses?

Printing Files

From MS-DOS you can run PRINT.BAS with the command BASIC PRINT. When prompted with "DOCUMENT," enter 'A' to get a listing of the files on drive A, or 'B' for those on drive B.

If you want to print any document showing the format commands, put the command .di at the very beginning of the file. Then print the file. The command .di disables the embedded commands, so they are printed along with the text.

Margins

Here are the margin commands:

.lm n	Set left margin to n.
.rm n	Set right margin to n.
.tm n	Set top margin to n.
.bm n	Set bottom margin to n.

Margins are stored internally as n-1. You can set the default values for the margins in Line 230 of PRINT.BAS. The hard upper-limit of margins will depend on the physical characteristics of your printer and the font you are using.

Titles and Page Numbers

Titles and page numbers use the same general format. The arguments specify the line number on which to print, the position relative to the margins (left justified, centered or right justified) and the text to be printed.

Up to 10 different titles may be specified. Page numbers and titles will be printed on each page after they've been defined, unless you turn them off. Once defined, they may be turned on or off, individually or all together.

.pg L,P,abcd	Print the page numbers at line L, position P, preceded by abcd.
.pn n	Set the page number to n. If n is not given, printing of page numbers is toggled on/off.
.nn	Don't print page numbers.
.nu	Print page numbers.
.ti n,L,P,ABCD	Print title n at line L, Postion P, using ABCD.
.nt	Don't print any titles.
.nt n	Don't print title n.
.ti	Print all titles.
.ti n	Print title n.

Illegally specified commands will be ignored. The defective command will be printed on your computer screen.

The space between the command and the argument is optional. It does improve readability.

PRINT.BAS assumes that 32767 is the largest page number you will ever need. If a larger number is needed, you can sacrifice speed of execution by removing the DEFINT statement in Line 10.

Line Spacing and Text Positioning

Here are the commands that control the spacing and positioning of text on a page:

.sp n	Set spacing to n lines. (Default = 1, maximum = 3)
.sk n	Skip n lines at this position in the text.
.vt n	Vertical tab to line n.
.ce	Center the next line.
.ce n	Center the next n lines.
.rj	Right justify text.
.np	Start a new page with the next line.
.np n	Start a new page if there are not n lines remaining.
.pz	Pause after each page feed.
.in n	Indent next line by n spaces.
.in -n	Outdent next line by n spaces.

PRINT.BAS supports true vertical tabs. The printer control sequences for these tabs may have to be changed for your printer in lines 3520, 3530, 7040 and 7050. Note that two separate vertical tab channels are used. If your printer does not have true vertical tabs or multiple channels, then set the line feed flag (LF) to 1 in Line 250. This can also be done with an .lf command.

File Include

You can direct PRINT.BAS to print a disk file as part of the current document.

.fi *filename*	Print the entire file "filename" at this position in the document.

The File Include command does not force a page at the beginning or the end of the included file. Page numbers are maintained.

The File Include command allows the creation of a master file that contains format controls and directs the printing of subsections. For example:

```
.lm 5     PRINT CONTROL FILE
.rm 70     (set margins for entire
           document)
.tm 6
.bm 60
.ti 1,3,R,PROPOSAL
.ti 2,3,L,March 3, 1985
.fi BACKGROUND
.fi RATIONAL
.fi METHODS
.fi TIME TABLE
```

The File Include command allows you to organize a group of related documents rather than create a single large document.

Printer Setup

You may send setup codes to your printer with the "quote" embedded command.

.qu abcd	Send 'abcd' to the printer.

This is useful for sending special control codes to the printer without the

need to modify PRINT.BAS. Note that the line is *not* treated as text.

Printer Control

PRINT.BAS allows you to place printer control characters anywhere in your text. By embedding these special characters, you can enable and disable up to three different print fonts.

PRINT.BAS assumes that ASCII 252, 253 and 254 are printer control characters for emphasize, underline and italicize respectively. These characters, along with corresponding control sequences for an Epson printer, are set in lines 40, 50 and 60. You may want to change these characters and/or corresponding control sequences to suit your particular word processor and/or printer.

The program also supports non-breaking spaces. Non-breaking spaces are used when you want a group of words to appear together on the same line, such as Louis IV. PRINT.BAS assumes that ASCII 251 is the non-breaking space, but this can be changed in Line 30.

Embedded Variables

PRINT.BAS allows you to embed the names of variables in your text. The values of the variables are determined at the time of printing. A special character is used to delimit the names of the variables. ASCII 222 is the special character that is assumed, but this can be changed in Line 30.

For example, a variable named "ADDRESS" could be embedded in your text using the special delimiting character. If a data file is not specified, or ADDRESS is not defined in the data file, then PRINT.BAS will request the value for ADDRESS from the keyboard at the time of printing. The value will be inserted in the exact location where ADDRESS appeared.

The variable named "DATE" will cause the current date to be inserted. Date format is set in Line 900.

Embedded variables that are numbers or lists of numbers are assumed to be reference citations. As noted, reference citations are renumbered sequentially at the time of printing.

Reference citations are superscripted with the control sequences set in Line 70. If your printer does not have superscription, set these sequences to null string.

Printing References

The .pr command causes references to be printed in the order in which they were cited in your document.

`.pr` PRINT.BAS expects your references to follow this command.

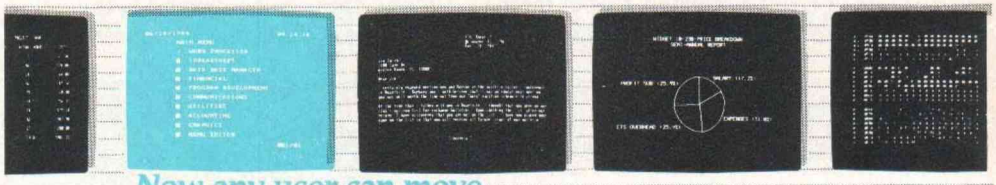
The lines following a .pr command are assumed to be either in the form of references or embedded commands. A reference begins with a number and ends with a carriage return. Any line that is not of this form and is not an embedded command will cause the .pr command to terminate.

Except for .fi and .pr, embedded commands will be executed when the reference immediately preceding the command is printed. The .fi command is executed immediately allowing you to look up references in separate files. A second appearance of the .pr command will cause the first .pr command to terminate.

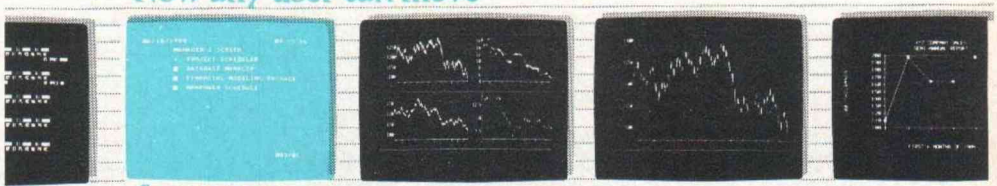
Sometimes it is useful to see the internal citation number in the printed document:

`.pr#` If the # character appears within a .pr command, the internal citation number will be

The more software you own

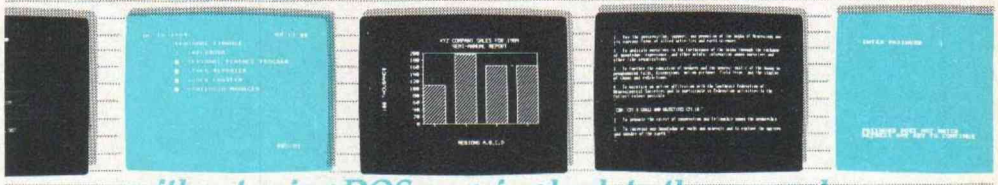


Now any user can move



from program

to program to program



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printed in the extreme right-hand margin following the reference, if there is room.

PRINT.BAS assumes that 200 strings are enough lines for all references, including continuation lines and embedded commands. If more string space is needed then RF should be increased in Line 10.

Selecting a Document

The program initially assumes disk drive A as the default drive. Initial default set in Line 30. You can change the default by entering 'B' or 'A' instead of a filename, or you can override the default by specifying the drive along with the filename (e.g., B:FILENAME).

Multiple Copies and Data Files

After you have selected a document, PRINT.BAS will request the number of copies to be printed. The default is 1. Instead of entering a number, you may enter the name of data file. When a data file is specified, PRINT.BAS will print one copy for each record in the data file. A record is 255 characters or less and is followed by a carriage return.

Each record in a data file can be used as a source of data values according to the rules given by a .va command.

Defining Variables in Data Files

The .va command defines how values for variables are stored in data files. Values can be stored in a "delimiter" format or in a "fixed field" format.

Delimiter Format:

```
.va,LAST NAME,FIRST NAME
```

The character that immediately follows the .va command is the delimiter. When using the delimiter format, the values in the data file as well as the names of the variables in the .va command are separated by this character. In this example, each record in the data file is expected to contain a last name and a first name separated by a comma.

Fixed Field Format:

```
.va,16,LAST NAME,16,FIRST NAME
```

When using the fixed field format, the delimiter is used only in the .va command itself. The numbers preceding the names of the variables indicate the number of columns each value is expected to occupy. In this example, the last name is expected to be in columns one through 16, the first name in columns 17 through 32.

PRINT.BAS will remove leading and trailing spaces when using the fixed field format. □

The listing:

```
1 '                  ASCII DOCUMENT PRINTER
2 '             written in MS-BASIC for an EPSON printer
3 '        (C) Copyright 1984 by John Melski, Marshfield, WI
4 '                        All rights reserved
9 '
10 DEFINT A-Z:PL=65:RF=200:DIM RF(RF),RF$(RF)                    'RF=REFERENCES
20 OPEN "LPT1:" FOR OUTPUT AS 1:WIDTH #1,255                     'PL=PAGE LEN-1
30 CS$=CHR$(251):CC$=CHR$(27):CC$(0)=CHR$(222):DR$="A:"          'CONTROL CHARS
40 CC$(1)=CHR$(252):CF$(1,0)=CC$+"F":CF$(1,1)=CC$+"E"            'emphasize
50 CC$(2)=CHR$(253):CF$(2,0)=CC$+"-0":CF$(2,1)=CC$+"-1"          'underline
60 CC$(3)=CHR$(254):CF$(3,0)=CC$+"5":CF$(3,1)=CC$+"4"            'italisize
70 CF$(4,0)=CC$+"T":CF$(4,1)=CC$+"S0"                            'superscript
80 DEF FNS$(A)=MID$(STR$(A),2)
99 '
100 CLS:PRINT:PRINT "DOCUMENT PRINTER (enter A or B to list files)"'START HERE
110 A$="DOCUMENT > ":FI=3:GOSUB 8000:FI$=C$                       'FI#3=DOC FILE
120 A$="NUMBER OF COPIES > ":FI=2:GOSUB 8000:FI=3                 'FI#2=VAR FILE
130 ON ERROR GOTO 140:PRINT#1,CC$"@"CC$"O";:ON ERROR GOTO 0:GOTO 200
140 GOSUB 150:RESUME 130
150 PRINT:PRINT "READY PRINTER -- THEN STRIKE ANY KEY":R$=INPUT$(1):RETURN
199 '
200 PRINT:IF NC THEN PRINT "PRINTING COPY";NC:GOTO 220           'MULT COPY LOOP
210 IF EOF(2) THEN CLOSE 2,3:GOTO 100
215 LINE INPUT#2,VV$:PRINT "PRINTING > ";VV$:VN$=""              'VV$=VAR VALUES
220 FOR I=0 TO 10:CF(I)=0:TI$(I)="":RS$(I)=""
225 FOR L=0 TO 3:TI(I,L)=0:NEXT L,I                              'INITIALIZE
230 LM=0:RM=79:TM=0:BM=63:SP=1:IN=LM                             'parameters
240 LP=0:LN=0:VT=0:PN=1:TI=0:RN=0:RS=0                           'counters
250 CR=-1:CE=0:RJ=0:DI=-1:LF=0:VA=0:PZ=0:PR=0:RP=0:RL=0          'flags
260 N=TM:GOSUB 7000:GOSUB 300                                    'print document
265 IF L$>"" THEN GOSUB 700                                      'last line
270 IF LN THEN GOSUB 760                                         'last page
280 IF NC THEN NC=NC-1:IF NC=0 THEN 100
290 PRINT#1,CC$"@"CC$"O";:OPEN FI$ FOR INPUT AS 3:GOTO 200
299 '
300 IF EOF(FI) THEN CR=-1:CLOSE FI:IF FI>3 THEN FI=FI-1:GOTO 300
    :ELSE IF PR THEN 5400:ELSE RETURN                            'INPUT A$ LOOP
310 LINE INPUT#FI,A$:IF LEFT$(A$,DI*CR)="." THEN GOSUB 2000:GOTO 300'commands
320 IF PR THEN IF VAL(LEFT$(A$,1)) OR CR=0 THEN GOSUB 9200:CR=LEN(A$)<255
    :GOTO 300:ELSE GOSUB 5400                                    'prnt ref
```

```
33Ø CR=LEN(A$)<255:GOSUB 4ØØ:IF CR THEN GOSUB 7ØØ:GOTO 3ØØ:ELSE 3ØØ 'prnt A$
399 '
4ØØ C$=A$:L=LEN(A$):FOR N=Ø TO 3:I=INSTR(A$,CC$(N))              'A$=MAIN STRING
41Ø IF I THEN MID$(A$,I)=CHR$(9):MID$(C$,I)=CHR$(N):L=L-1:N=N-1 'C$=CONTROL STR
42Ø NEXT N:IF CE THEN IN=(IN+RM-L)\2:IN=-IN*(IN>Ø):LP=IN
499 '
5ØØ I=INSTR(A$,CHR$(9)):IF I=Ø THEN P$=A$:GOTO 6ØØ               'PARSE A$ TO P$
51Ø P$=LEFT$(A$,I-1):I=LEN(A$)-I:C$=RIGHT$(C$,I+1):A$=RIGHT$(A$,I)
52Ø GOSUB 6ØØ:I=ASC(C$):ON I+1 GOSUB 55Ø,54Ø,54Ø,54Ø,54Ø,,,,,53Ø:GOTO 5ØØ
53Ø I=8-(LP-IN)MOD 8:LP=LP+I:L$=L$+SPACE$(I):RETURN               'horizontl tab
54Ø CF(I)=NOT CF(I):L$=L$+CF$(I,-CF(I)):RETURN                    'change font
55Ø VA=NOT VA:IF VA THEN V$="":RETURN                             'get variable
56Ø IF VAL(LEFT$(V$,1)) THEN GOSUB 9ØØØ:ELSE GOSUB 9ØØ
57Ø IF CE THEN I=IN+(LEN(V$)-LEN(P$))\2:I=-I*(I>Ø):LP=LP+I-IN:IN=I
58Ø GOSUB 6ØØ:RETURN
599 '
6ØØ L=LEN(P$):IF VA THEN IF LEN(V$)+L<255 THEN V$=V$+P$:RETURN
   :ELSE BEEP:PRINT "  MISSING<"CC$(Ø)">"V$P$:VA=Ø:RETURN          'V$=VARIBL NAME
61Ø IF LP+L<=RM THEN L$=L$+P$:LP=LP+L:RETURN                      'P$=PRINTABLES
62Ø FOR I=RM-LP+1 TO 1 STEP -1                                    'L$=PRINT LINE
625 IF INSTR(" -",MID$(P$,I,1)) THEN I=I-(MID$(P$,I+1,1)=" "):GOTO 65Ø
63Ø NEXT I:FOR I=LEN(L$) TO 1 STEP -1
635 IF INSTR(" -",MID$(L$,I,1))*(MID$(L$,I+(I>1),1)>CC$) THEN 67Ø
64Ø NEXT I:I=RM-LP
65Ø L$=L$+LEFT$(P$,I):P$=MID$(P$,I+1):IF RJ THEN GOSUB 8ØØ          'BREAK P$
66Ø GOSUB 7ØØ:GOTO 6ØØ
67Ø R$=MID$(L$,I+1):L$=LEFT$(L$,I):T=LEN(R$):I=INSTR(R$,CC$)        'BREAK L$
675 WHILE I:T=T-2+(INSTR("WSp-!RisA3JjC/QlU",MID$(R$,I+1,1))>Ø)
68Ø I=INSTR(I+1,R$,CC$):WEND:IF RJ THEN I=-T:GOSUB 8ØØ
69Ø GOSUB 7ØØ:L$=R$:LP=LP+T:GOTO 6ØØ
699 '
7ØØ IF LN=Ø THEN GOSUB 1ØØØ                                       'GOSUB HEADERS
71Ø I=INSTR(L$,CS$):WHILE I:MID$(L$,I)=" ":I=INSTR(L$,CS$):WEND
72Ø IF CF(2) THEN PRINT#1,CF$(2,Ø);:L$=CF$(2,1)+L$
73Ø PRINT#1,SPACE$(IN);L$;STRING$(SP,CHR$(13));
74Ø L$="":LN=LN+SP:LP=LM:IN=LM:CE=CE+(CE>Ø)
75Ø IF LN<=BM THEN RETURN
76Ø GOSUB 1ØØØ:IF LN<=PL THEN PRINT#1,CHR$(12);                    'GOSUB FOOTERS
77Ø IF PZ THEN GOSUB 15Ø
78Ø LN=Ø:IF PN=32767 THEN BEEP:PRINT "  PAGE NUMBER EXCEEDS 32767":RETURN
79Ø PN=PN+1:RETURN
799 '
8ØØ LP=LP+I:I=LEN(L$)                                            'RIGHT JUSTIFY
81Ø WHILE MID$(L$,I,1)=" ":LP=LP-1:I=I-1:IF I THEN WEND
82Ø L$=LEFT$(L$,I):IF LP=RM THEN RETURN:ELSE L=Ø:FOR I=1 TO RM-LP
83Ø L=INSTR(L+2,L$," "):IF L=Ø THEN IF I>1 THEN 83Ø:ELSE RETURN
84Ø L$=LEFT$(L$,L)+" "+MID$(L$,L+1):NEXT I:RETURN
899 '
9ØØ GOSUB 537Ø:IF V$="DATE" THEN P$=DATE$:P$=MID$(P$,4,2)
   +MID$("JANFEBMARAPRMAYJUNJULAUGSEPOCTNOVDEC",VAL(P$)*3-2,3)
   +MID$(P$,9):RETURN
91Ø I=INSTR(VN$,CC$+V$)                                           'LOOK-UP VARIBL
92Ø IF I=Ø OR NC THEN PRINT "  "V$"? ";:LINE INPUT P$:RETURN      'input variable
93Ø T=ASC(MID$(VN$,I-1)):IF VF(T,Ø) THEN 96Ø                      'look-up value
94Ø I=Ø:FOR T=Ø TO T:L=I+1:I=INSTR(L,VV$,VD$):NEXT T              'dlimiter field
95Ø P$=MID$(VV$,L,I-(I=Ø)*256-L):RETURN
96Ø P$=MID$(VV$,VF(T,Ø),VF(T,1)):I=1:L=LEN(P$)                    'fixed field
97Ø WHILE MID$(P$,I,1)=" ":I=I+1:WEND
98Ø IF I<L THEN WHILE MID$(P$,L,1)=" ":L=L-1:WEND
99Ø P$=MID$(P$,I,L-I+1):RETURN
999 '
1ØØØ FOR N=Ø TO VT:IF LN>VT(N) THEN NEXT N:RETURN                 'TITLES/PAGE#
1Ø1Ø FOR N=N TO VT:IF LN<VT(N) THEN L=LN:LN=VT(N)
    :IF LF THEN PRINT#1,STRING$(LN-L,CHR$(13));:ELSE PRINT#1,CHR$(11);'vtab
1Ø2Ø IF LN=TM THEN RETURN:ELSE IF LN>TM AND LN<=BM THEN 1Ø9Ø
1Ø3Ø T$=SPACE$(255):I$=T$:FOR I=Ø TO TI                           'get TIs for LN
```

```
1ø4ø IF TI(I,ø)=ø OR TI(I,1)<>LN THEN 1ø7ø
1ø5ø IF I=ø THEN TI$(ø)=TI$+FNS$(PN):T=LEN(FNS$(PN))
     :TI(ø,2)=T2-T*T1\2:TI(ø,3)=T3-T*(2-T1)\2                    'adjust page TI
1ø6ø L=TI(I,2):MID$(I$,L)=CHR$(I):MID$(T$,L)="T"
1ø7ø NEXT I:T=1:L=INSTR(T$,"T")
1ø8ø IF L THEN WHILE L:I=ASC(MID$(I$,L)):PRINT#1,SPACE$(L-T);TI$(I);
     :T=TI(I,3):L=INSTR(T,T$,"T"):WEND:PRINT#1,:LN=LN+1          'print titles
1ø9ø NEXT N:RETURN
1999 '
2ØØØ P$=A$:C$="":FOR I=2 TO 3                                    'DOT COMMANDS
2Ø1ø L=ASC(MID$(P$,I)):C$=C$+CHR$(L+(I-2+(L>9ø))*32):NEXT I
2Ø3ø CO=INSTR("LmRmTmBmVtPgPnNnNuSpSkCeTpNpInTiNtFiQuDiRjLfPzVaPr",C$)
2Ø4ø IF PR THEN IF INSTR("PrFi",C$)=ø THEN 93ØØ
2Ø5ø CO=CO\2+1:P$=MID$(P$,4):IF CO<18 THEN GOSUB 6ØØØ:N=N+(CO<6)
2Ø6ø ON CO GOTO 31ØØ,32ØØ,33ØØ,34ØØ,35ØØ,36ØØ,37ØØ,38ØØ,38ØØ,39ØØ,4ØØØ,41ØØ,42ØØ
,42ØØ,44ØØ,45ØØ,46ØØ,47ØØ,48ØØ,49ØØ,5ØØØ,51ØØ,52ØØ,53ØØ,54ØØ
3ØØØ BEEP:PRINT "  COMMAND ERROR > ";A$:RETURN                    'command error
31ØØ IF N<ø OR N>RM THEN 3ØØØ:ELSE LM=N:IN=N:LP=N:RETURN         'Lm=LEFT MARGIN
32ØØ IF N<LM OR N>131 THEN 3ØØØ:ELSE RM=N:RETURN                 'Rm=RIGHT MRGN
33ØØ IF N<ø OR N>BM THEN 3ØØØ:ELSE TM=N:GOTO 7ØØØ                'Tm=TOP MARGIN
34ØØ IF N<TM OR N>PL THEN 3ØØØ:ELSE BM=N:RETURN                  'Bm=BOTTOM MRGN
35ØØ IF N<ø OR N>PL THEN 3ØØØ:ELSE IF LN>=N THEN RETURN          'Vt=VERT TAB
351ø SWAP LN,N:IF LF THEN PRINT#1,STRING$(LN-N,CHR$(13));:RETURN
352ø PRINT#1,CC$"b"CHR$(1)CHR$(LN)CHR$(ø);                      'set channel 1
353ø PRINT#1,CC$"/"CHR$(1)CHR$(11)CC$"/"CHR$(ø);:RETURN         'execute tab
36ØØ CO=ø:GOTO 453ø                                             'Pg=PAGE TITLE
37ØØ IF N THEN PN=N:C$="Nu":ELSE TI(ø,ø)=NOT TI(ø,ø):RETURN     'Pn=SET PG#
38ØØ TI(ø,ø)=C$="Nu":RETURN                                     'Nu/Nn=on/off
39ØØ IF N<ø OR N>3 THEN 3ØØØ:ELSE SP=N:RETURN                   'Sp=SPACING
4ØØØ N=LN+N-(LN=ø)*TM:GOTO 35ØØ                                 'Sk=SKIP
41ØØ IF N<ø THEN 3ØØØ:ELSE CE=N-(N=ø):RETURN                    'Ce=CENTER
42ØØ IF N AND LN+N<=BM THEN RETURN                               'Tp=TEST PAGE
43ØØ GOSUB 7ØØ:IF LN THEN 76ø:ELSE RETURN                       'Np=NEW PAGE
44ØØ N=LM+N:IF N<ø OR N>RM THEN 3ØØØ:ELSE IN=N:LP=N:RETURN       'In=INDENT
4499 '
45ØØ IF N=ø THEN FOR I=1 TO TI:TI(I,ø)=-1:NEXT I:RETURN          'Ti=TITLES
451ø IF N<ø OR N>1ø THEN 3ØØØ:ELSE CO=N
452ø GOSUB 6ØØØ:IF N=ø THEN TI(CO,ø)=-1:RETURN                   ',ø)=on/off
453ø N=N-1:IF N<ø OR N>PL THEN 3ØØØ:ELSE TI(CO,1)=N               ',1)=line#
454ø GOSUB 7ØØØ:TØ=INSTR(" L1CcRr",MID$(P$,2,1))\2-1:IF TØ<ø THEN 3ØØØ
455ø I=3:WHILE INSTR(" ,-;:/",MID$(P$,I,1))=ø:I=I+1:WEND
456ø P$=MID$(P$,I+1):IF LEN(P$)>RM THEN 3ØØØ
457ø A$=P$:IN=ø:LP=ø:CE=ø:GOSUB 4ØØ                              ',2)=position
458ø TI(CO,2)=(LM*(2-TØ)+(RM-LP)*TØ)\2+1:TI(CO,3)=TI(CO,2)+LP
4585 IF CO=ø THEN T1=TØ:T2=TI(ø,2):T3=TI(ø,3):TI$=L$
459ø IN=LM:LP=LM:IF CO>TI THEN TI=CO
4595 TI$(CO)=L$:L$="":TI(CO,ø)=-1:RETURN                         'TI$(CO)=text
4599 '
46ØØ IF N=ø THEN FOR I=1 TO TI:TI(I,ø)=ø:NEXT I:RETURN           'Nt=SUPRESS TI
461ø IF N<ø OR N>1ø THEN 3ØØØ:ELSE TI(N,ø)=ø:RETURN
4699 '
47ØØ WHILE LEFT$(P$,1)=" ":P$=MID$(P$,2):WEND:R$=""              'Fi=INCLUDE DOC
471ø IF MID$(P$,2,1)<>":" THEN R$=DR$:ON ERROR GOTO 475ø:GOTO 473ø
472ø ON ERROR GOTO 476ø
473ø OPEN R$+P$ FOR INPUT AS FI+1:FI=FI+1
474ø ON ERROR GOTO ø:RETURN
475ø R$=CHR$(66+(ASC(R$)=66))+":":RESUME 472ø
476ø GOSUB 3ØØØ:RESUME 474ø
4799 '
48ØØ WHILE LEFT$(P$,1)=" ":P$=MID$(P$,2):WEND:PRINT#1,P$;:RETURN'Qu=PRNT CONTRL
49ØØ DI=NOT DI:RETURN                                           'Di=DISENABLE
5ØØØ RJ=NOT RJ:RETURN                                           'Rj=RIGHT JUST
51ØØ LF=NOT LF:RETURN                                           'Lf=LINE FEED
52ØØ PZ=NOT PZ:RETURN                                           'Pz=PAGE PAUSE
5299 '
53ØØ VN$="":FOR I=ø TO 1ø:VF(I,ø)=ø:VF(I,1)=ø:NEXT I            'VN$=VAR NAMES
531ø VD$=LEFT$(P$,1):P$=MID$(P$,2)+VD$:T=ø:L=1                  'VD$=VAR DELIM
```

```
532Ø I=INSTR(P$,VD$):IF I=Ø THEN RETURN                              'VF(=VAR FIELDS
533Ø V$=LEFT$(P$,I-1):P$=MID$(P$,I+1):N=VAL(LEFT$(V$,4))             ',Ø)=field pos
534Ø IF N THEN IF N<1 OR N+L>255 THEN BEEP:PRINT "  FIELD OUT OF RANGE":RETURN
    :ELSE VF(T,Ø)=L:VF(T,1)=N:L=L+N:GOTO 532Ø                        ',1)=field len
535Ø IF LEN(V$)+LEN(VN$)+2>255 THEN BEEP:PRINT "  TOO MANY VARIABLES":RETURN
536Ø GOSUB 537Ø:VN$=VN$+CHR$(T)+CC$+V$:T=T+1:GOTO 532Ø
537Ø FOR I=1 TO LEN(V$):N=ASC(MID$(V$,I))                            'make UPPERCASE
538Ø IF N>96 AND N<123 THEN MID$(V$,I)=CHR$(N-32)
539Ø NEXT I:RETURN
5399 '
54ØØ PR=NOT PR:IF PR THEN RP=INSTR(P$,"#"):N=Ø:RL=RF
   :FOR I=1 TO RN:RF(I)=Ø:RF$(I)="":NEXT I:RETURN                    'Pr=PRINT REF
541Ø RF$(Ø)=A$:FOR RN=1 TO RN:A$=RF$(RN):CR=LEN(A$)<255
542Ø P$=A$:GOSUB 6ØØØ:A$=P$:IF RP THEN RP=N
543Ø L$=FNS$(RN):LP=LEN(L$):IN=LM-LP-2:IN=-IN*(IN>Ø):LP=LP+IN:RL=RN:GOSUB 4ØØ
544Ø WHILE CR=Ø:RL=RF(RL):A$=RF$(RL):CR=LEN(A$)<255:GOSUB 4ØØ:WEND  'continue
545Ø IF RP THEN R$=STR$(RP):I=8Ø-LEN(R$)-LP:IF I=>Ø THEN L$=L$+SPACE$(I)+R$
546Ø GOSUB 7ØØ:WHILE RF(RL):RL=RF(RL):A$=RF$(RL)                     'commands
547Ø IF DI THEN GOSUB 2ØØØ:ELSE GOSUB 4ØØ:GOSUB 7ØØ
548Ø WEND:NEXT RN:RN=RN-1:RL=Ø:A$=RF$(Ø):RETURN
5999 '
6ØØØ N=1:WHILE INSTR("-123456789",MID$(P$,N,1))=Ø:N=N+1:WEND         'GET N FROM P$
6Ø1Ø L=N+1:WHILE INSTR(" Ø123456789",MID$(P$,L,1))>1:L=L+1:WEND
6Ø2Ø ON ERROR GOTO 6Ø4Ø:N=VAL(MID$(P$,N,L-N))
6Ø3Ø P$=MID$(P$,L):ON ERROR GOTO Ø:RETURN
6Ø4Ø BEEP:PRINT "  OVERFLOW > ";MID$(P$,N,L-N):N=Ø:RESUME NEXT
6999 '
7ØØØ FOR I=Ø TO VT:IF VT(I)<N THEN NEXT I:GOTO 7Ø3Ø                   'Vt FOR TmTiPg
7Ø1Ø IF VT(I)=N THEN RETURN
7Ø2Ø FOR L=VT+1 TO I+1 STEP -1:VT(L)=VT(L-1):NEXT L
7Ø3Ø VT(I)=N:VT=VT+1:IF LF THEN RETURN
7Ø4Ø PRINT#1,CC$"B";:FOR I=1 TO VT:PRINT#1,CHR$(VT(I));:NEXT I       'set channel Ø
7Ø5Ø PRINT#1,CHR$(Ø);:RETURN
7999 '
8ØØØ PRINT:PRINT A$;:INPUT;"",C$                                     'INPUT FILES
8Ø1Ø IF C$="" THEN IF FI=3 THEN SYSTEM:ELSE C$="1":PRINT 1;
8Ø2Ø PRINT:NC=VAL(C$):IF NC*(FI=2) THEN 8Ø7Ø
8Ø3Ø ON ERROR GOTO 8Ø8Ø:I=INSTR("A:a:B:b:",C$)                        'DR$=DISK DRIVE
8Ø4Ø IF I MOD 2=1 THEN DR$=MID$("A:A:B:B:",I,2):FILES DR$:GOTO 8ØØØ
8Ø5Ø IF MID$(C$,2,1)<>":" THEN C$=DR$+C$
8Ø6Ø OPEN C$ FOR INPUT AS FI
8Ø7Ø ON ERROR GOTO Ø:RETURN
8Ø8Ø BEEP:RESUME 8ØØØ
8999 '
9ØØØ P$=V$:T=Ø:IF RL THEN RETURN                                     'EXPLODE REF#s
9Ø1Ø GOSUB 6ØØØ:I=N:IF LEFT$(P$,1)="-" THEN GOSUB 6ØØØ:N=-N
9Ø2Ø IF I THEN FOR I=I TO N:T=T+1:RF(T)=I:NEXT I:GOTO 9Ø1Ø
9Ø3Ø FOR I=1 TO T:N=RF(I):GOSUB 91ØØ:RF(I)=N:NEXT I
9Ø4Ø WHILE I:I=Ø:FOR L=1 TO T-1                                       'BUBBLE SORT RF
9Ø5Ø IF RF(L)>RF(L+1) THEN SWAP RF(L),RF(L+1):I=1
9Ø6Ø NEXT L:WEND
9Ø7Ø P$="":R$="":FOR I=1 TO T:P$=P$+R$+FNS$(RF(I)):R$=","            'IMPLODE REF#s
9Ø8Ø FOR L=I+2 TO T:IF RF(L)-2=RF(L-2) THEN R$=CHR$(173):I=L-1:NEXT L
9Ø9Ø NEXT I:L$=L$+CF$(4,1):CF(4)=-1:A$=CHR$(9)+A$:MID$(C$,1)=CHR$(4):RETURN
9Ø99 '
91ØØ R$="<"+FNS$(N)+">":FOR N=Ø TO RS:L=INSTR(RS$(N),R$)              'CONVERT REF#
911Ø IF L THEN N=VAL(MID$(RS$(N),L+LEN(R$))):RETURN
912Ø NEXT N:N=Ø:IF PR THEN RETURN:ELSE IF RN=RF THEN 9999
913Ø RN=RN+1:N=RN:R$=R$+FNS$(N)                                      'ASSIGN REF#
914Ø IF LEN(RS$(RS))+LEN(R$)>255 THEN IF RS<1Ø THEN RS=RS+1
    :ELSE BEEP:PRINT "  TOO MANY REFERENCES":RETURN
915Ø RS$(RS)=RS$(RS)+R$:RETURN
9199 '
92ØØ IF CR THEN P$=A$:GOSUB 6ØØØ:GOSUB 91ØØ:RF$(N)=A$:RETURN         'SET UP RF$()
93ØØ IF N=Ø THEN RETURN                                              'LINKED LISTS
931Ø IF RL>RN THEN RF(N)=RL:N=RL:RF$(N)=A$:RF(N)=Ø:RL=RL-1:RETURN
9999 BEEP:PRINT "  RF() IS TOO SMALL":PR=Ø:RETURN
```

PCM

Access Your Disk Directories from BASIC

By Robert D. Covington

For some reason, most versions of BASIC don't support directories from inside a BASIC program. Ironically, BASIC is capable of extensive file manipulations but it is incapable of knowing what is on the disk. The closest GW-BASIC gets to accessing the directory from BASIC is the FILES statement.

In the past few years, I have seen quite a few strange methods for getting around BASIC's inability to access a subdirectory. One method is to clear the screen, execute a FILES statement, and use the SCREEN function to load the contents of the screen into a string. Another method is to create a file in the directory that points to the disk's directory (you, of course, need a "disk zapper" and a lot of knowledge of MS-DOS to do this). Then, this file can be accessed from BASIC to read the directory. As you can see, both of these methods are very cumbersome and prone to errors.

In this month's installment of "Subroutine City," a very short and simple subroutine is described that not only retrieves the name of the files on the disk but also various other information contained in the directory.

(Bob Covington has been a computer programmer and consultant for the past six years, most recently focusing his attention on both the Model 100 and the 2000. He is also a technical writer and editor. Bob can be contacted at P.O. Box 37007, St. Louis, MO 63141.)

MS-DOS's Directory Structure

MS-DOS stores three pieces of information in its directory: volume name, subdirectory information and file information.

The volume name is the name that describes the entire disk. This name is usually set with the FORMAT utility when the /V option is selected. In most cases, the volume name is used by users and application programs to verify that the correct disk is inserted in a specific drive. Like most system data, the volume name can only be accessed on the root directory.

The subdirectory information is used to describe the name and files associated with a subdirectory. In most cases, the only user-readable information in this section is the actual subdirectory name. The rest of the information stored with the subdirectory entry is usually useless to the user.

The file information is used to describe the name, size, date, time, attribute and location of a file. All of this information except for the location of the file and the file attribute is accessible from MS-DOS command level with the DIR command.

How does MS-DOS know if an entry is a volume name, subdirectory or file? MS-DOS internally stores a two-byte attribute with each entry in the directory. By setting and resetting individual bits in the attribute, a directory entry can take on various forms. Table 1 describes the functions of the attribute bits used by MS-DOS. As you can see from this table, only six bits of the 16

Table 1
Directory Search Attribute Bit Map

Bit:
- 0 — Read only
- 1 — Invisible file
- 2 — System file
- 3 — Volume label only
- 4 — Sub-directory names
- 5 — Archive files

available bits are used for the attribute. For example, if bit three were set in a directory entry, the file would be considered by MS-DOS to be a volume name entry. If bit four were set, the entry would be considered a subdirectory entry.

The remaining bits in the attribute word are used to describe a user file. Read only status (bit zero, as the name implies, tells MS-DOS that the information in the file cannot be changed but only read. Invisible status (bit one) makes a file invisible from a normal MS-DOS `DIR` command. This status (bit two) is used to "hide" many of MS-DOS's internal files such as the BIOS. The system status is used to tell MS-DOS that a certain file is required for an operational MS-DOS system. Any file with this status is usually copied with a `SYS` or a `FORMAT /S` command. If a file has none of the above attributes, it is usually considered an ordinary read/write access file.

The archive status (bit five), unlike most of the other attributes, is periodically changed by the system. The archive status is used to report if a file has been modified. This status is mostly used to inform copy utilities that a file has been changed and that the backup of that file should be changed also. In most cases, the status of this bit has no effect on the actual MS-DOS operating system.

Directory Access Subroutine

Lines 16000-16060 of Program 1 contain the subroutine for directly accessing the information contained on a disk's directory from BASIC. This subroutine will search through the entire directory for a file with a certain attribute and pathname. On entry to this subroutine, `PN$` contains the desired pathname search attribute and `AT%` contains the attribute to search for. The pathname can be any legal MS-DOS global pathname descriptor. For example, if `PN$` were equal to `*.BAS`, the subroutine would search for all files with the `.BAS` extension. The search attribute can be used to include files with peculiar attributes in the directory returned to BASIC. A few examples of legal attributes are:

- 0 — All normal files with no special attributes
- 7 — All readable files
- 8 — Volume name only
- 15 — All readable files and volume name
- 16 — Normal files with no special attributes and subdirectories
- 31 — All readable files with volume name and subdirectories

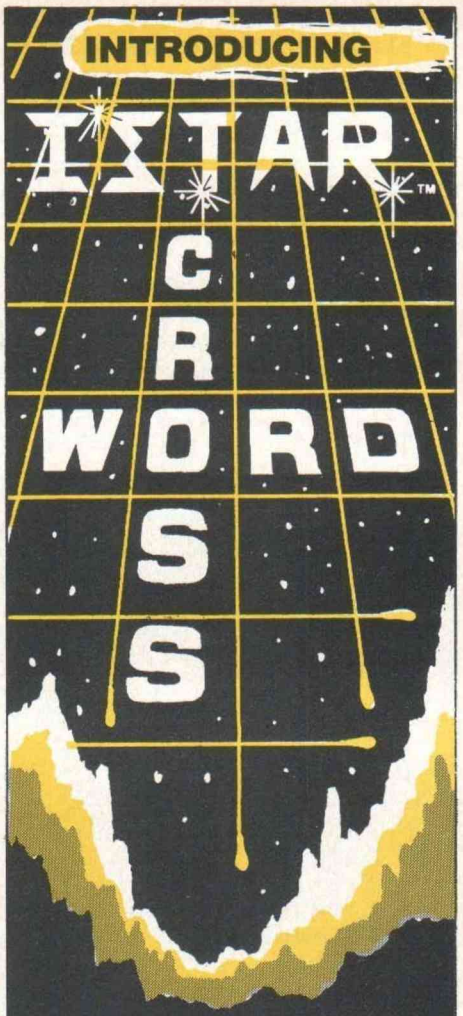
With MS-DOS 2.1x, performing the command: `PN$="*.*":AT%=31:GOSUB 16000` will cause this subroutine to return all of the directory entries on the current default drive/directory. If such a universal search qualification is used, make sure your program recognizes that the returned information includes more than just filenames.

On exit from the directory access subroutine, `N` contains the number of directory entries found, `N$( )` contains the path/volume/directory name found in each directory entry, `L!( )` contains the length of the file in bytes, `AT%( )` contains the actual attribute of the directory entry and `E` contains the error status. The error status returned in `E` can have the following error codes:

- 0 — No error
- 2 — Invalid pathname
- 18 — No match

The arrays `N$( )`, `L!( )` and `AT%( )` only contain information on directory entries that meet the pathname and attribute qualifications passed to the subroutine on entry. If, for example, a very ambiguous search qualification is used, such as `PN$="*.*":AT%=31`, the attribute in `AT%( )` will need to be used to organize the returned information into the directory's three distinctive groups (volume name, subdirectories and files). If a very specific search qualification is used, such as `PN$="DB.BAS":AT%=0`, the data returned from the subroutine should not require many array elements.

The demonstration program in lines 30-75 obtains the filenames of all the files with a `.BAS` extention on the current default drive and allows them to be executed by the program. Line 30 loads the names of all the normal attribute files with a `.BAS` extention into `N$( )`. If no files are found with the `.BAS` extention, the program prints a warning message and the program is aborted. Lines 50-75 allow the user to



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scan through the list of program names by pressing the up and down arrows. As the user scans through the names, each filename is printed in the center of the screen. When the space bar is pressed, the RUN in Line 100 executes the BASIC program that is currently displayed on the screen.

Subroutine City Corrections

In my June 1985 installment of "Subroutine City," I made a slight error in describing the efficiency of the binary search algorithm. On Page 57, I stated that ". . . the greatest number of compares (required for a binary search) is equal to the square root of the number of records in the data array." I am sure that any Computer Science professor would shriek at those words. In actuality, the greatest number of compares required by a binary search is equal to the LOG base 2 of the number of records in the data array. This means that a 1,000 element array requires only ten actual compares (not 33 as I stated later in the article). In either case, the binary search is still one of the fastest searches around.

End Notes

If you have any question, comments, suggestions, etc. on any of the material presented in this series or questions about Tandy's MS-DOS, feel free to write to me at P.O. Box 37007, Creve Coeur, MO 63141. Please enclose a self-addressed stamped envelope if you want a reply to your letter. □

The Listing:

```
1 ' *** MSDOS Function Subroutines for BASIC
2 ' *** By Robert D. Covington
10 DIM B$,AX,BX,CX,BP,SI,DI,SW,N$(1000),L!(1000),AT%(1000),T(1000),D(1000)
20 FOR X=1 TO 100:READ A:BIOS$=BIOS$+CHR$(A):NEXT:X=FRE(X):V=VARPTR(BIOS$):BIOS!
=PEEK(V+1)+PEEK(V+2)*256
25 SP$=SPACE$(80):NL$=CHR$(0)
30 AT%=0:PN$="*.BAS":GOSUB 16000:IF N=0 THEN LOCATE 12,36:PRINT"No Files":BEEP:E
ND
40 CLS:PRINT"Use the Up and down arrows to scan through the available BASIC prog
rams.":PRINT"Press the space bar to run the program.":F=0:GOTO 60
50 A$=INKEY$:IF A$="" THEN 50 ELSE A=ASC(A$):IF A<30 OR A>32 THEN 50 ELSE ON A-2
9 GOTO 60,70,100:GOTO 50
60 F=F+1:IF F>N THEN F=1
65 GOTO 75
70 F=F-1:IF F<1 THEN F=N
75 LOCATE 12,1:PRINT SP$;:LOCATE 12,(80-LEN(N$(F)))/2:PRINT N$(F);:GOTO 50
100 X$=N$(F):RUN LEFT$(X$,INSTR(X$,".")-1)
999 END
16000 ' *** Read directory
16001 '  Entry:
16002 '           PN$ - Pathname
16003 '           AT% - Search file attributes
16004 '  Exit:
16005 '             E - Error status
16006 '             N - Number of files found
16007 '         N$() - Matching pathnames (files)
16008 '         L!() - Length of file in bytes
16009 '        AT%() - Attribute of file
16010 '
16020 I=33:A$=SPACE$(43):GOSUB 32000:AX%=6656:GOSUB 40000
16030 AX%=19968:CX%=AT%:PN$=PN$+CHR$(0):SWAP PN$,A$:GOSUB 32000:SWAP PN$,A$:GOSU
B 40000:N=0:E=AX%:IF E>0 THEN RETURN
16040 N=N+1:X$=MID$(A$,31):N$(N)=LEFT$(X$,INSTR(X$,NL$))
16050 L!(N)=CVI(MID$(A$,27,2))+CVI(MID$(A$,29,2))*65536!:AT%(N)=ASC(MID$(A$,22,1
```


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```
))
16Ø6Ø AX%=2Ø224:GOSUB 4ØØØØ:E=AX%:IF E=18 THEN E=Ø:RETURN ELSE 16Ø4Ø
31ØØØ ' *** Convert Integer to signed integer
31ØØ1 '  Entry:
31ØØ2 '          A! - Integer (Ø-65535)
31ØØ3 '  Exit:
31ØØ4 '          A% - Signed Integer (-32768 - 32767)
31ØØ5 '
31Ø1Ø IF A!>32767 THEN A%=A!-65536! ELSE A%=A!
31Ø15 RETURN
32ØØØ ' *** Find address for string
32ØØ1 '  Entry:
32ØØ2 '          A$ - String to find address of text
32ØØ3 '  Exit:
32ØØ4 '         DX% - Address of text in string
32ØØ5 '
32Ø1Ø V!=VARPTR(A$):A!=PEEK(V!+1)+PEEK(V!+2)*256:GOSUB 31ØØØ:DX%=A%:RETURN
4ØØØØ ' *** Call DOS function
4ØØØ1 ' I - Interrupt Number
4ØØØ2 ' AX%, BX%, CX%, DX%, BP%, SI%, and DI% - Registers passed to and from DOS
4ØØØ3 ' SW% - Status word
4ØØØ4 '
4ØØ1Ø MID$(BIOS$,48,1)=CHR$(I):CALL BIOS!(AX%,BX%,CX%,DX%,BP%,SI%,DI%,SW%):RETUR
N
5ØØØØ ' Program:BIOS          Length: 1ØØ bytes
5ØØØ1 DATA 3Ø,7,139,236,139,94,4,255,55,157,139,94,6,139,63,139,94,8,139,55,139,
94,12,139,23,139,94,14,139,15,139,94,18,139,7,139,94,16,139,31,139,11Ø,1Ø,139,11
Ø,Ø,2Ø5,33,85,83,139,236,139,94,8,156,143,7,139,94,1Ø,137,63,139,94,12
5ØØØ2 DATA 137,55,139,94,16,137,23,139,94,18,137,15,139,94,22,137,7,91,139,11Ø,2
Ø,137,94,Ø,139,11Ø,14,91,137,94,Ø,2Ø2,16,Ø
6ØØØØ A$=INKEY$:IF A$="" THEN 6ØØØØ ELSE PRINT ASC(A$):GOTO 6ØØØØ
```

PCM

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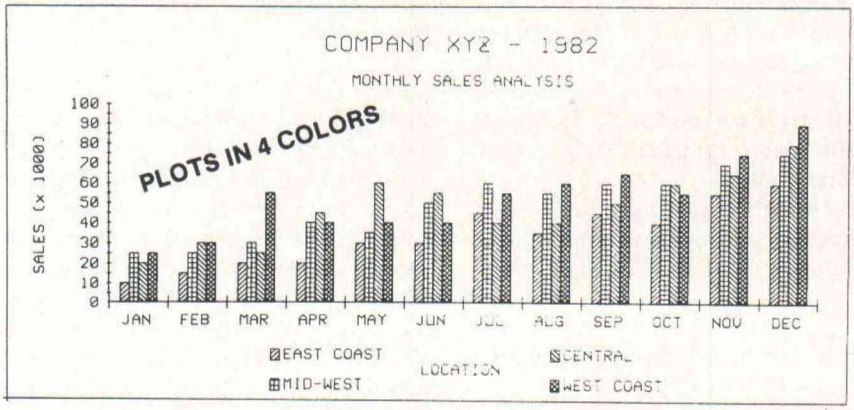

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A potentially dangerous bug is discovered in Tandy 200 BASIC.

If X Equals Zero Then X Equals Ten Trillion

By Dr. Laurence D. Preble

I write software, both in BASIC and Assembler. And I make mistakes. Usually, I end up spending more time debugging my programs than I spend writing the programs in the first place. Most programmers would tell you the same thing. The people who developed Microsoft BASIC for the Tandy 200 would probably concur.

I tell you this because Microsoft writes some really great software and does, for the most part, a thorough job of debugging the software. When writing a BASIC program, I encounter many of my own mistakes. It is rare that I encounter a mistake in the BASIC interpreter itself.

Typos are the most common errors made. A misplaced comma here or there does the trick just fine. For example:

```
F,OR X=1 TO 100
```

(Note that the comma does not belong here!)

Typos usually are detected by the BASIC interpreter and generate the infamous ?SN error (syntax error). I make lots of syntax errors!

Grammatical errors occur when properly spelled words are just used incorrectly. An example in English could be, "For years I could not spell programmer. Now I *are* one." A BASIC example:

```
NEXT X:FOR X=1 TO 100
```

(Should read: `FOR X=1 TO 100:NEXT X`)

The BASIC interpreter will detect most grammatical errors as well as errors in syntax.

Logical errors are more trouble to detect. Logical errors occur when you give the computer a grammatically correct statement which unfortunately does not convey the right message. Have you ever spoken with someone who just happened to be talking while sound asleep? I have. You might get something like, "Larry, don't forget to wind up the refrigerator!" Now, that is a grammatically correct command — but it just does not make any sense! In Computer Lingo, you might have said something like `FOR X=1 TO 100` when you really meant to say `FOR X=1 to 200`. Both statements are grammatically correct. Only one will do the right job.

A truly rare bird is "The Dreaded

(Dr. Laurence D. Preble is a Louisville chiropractor who worked his way through college by programming. His avocational interests include flying and ham radio. His interest in microcomputers dates from when you had to build your own — which he did.)

System Bug!" Unfortunately, I just stumbled across exactly that sort of error in Microsoft BASIC for the Tandy 200.

The bug is easy to miss because it only pops up when all of the conditions are just right. The bug involves a combination of two unrelated statements. INT and PRINTUSING. To illustrate the bug, type in the following simple program:

```
10  X=INT (.1)
20  PRINT X
30  PRINTUSING"################";X
```

In Line 10, X should be assigned the integer portion of (.1). Since the integer portion of (.1) is 0, X should be equal to zero!

In Line 20, the value of X is printed out. Sure enough, the answer is zero.

In Line 30, X should again be printed out but should be printed with 13 leading blanks because of the rules of formatting used with the PRINTUSING statement.

Now lets look at what really happens. Run the program. The Model 100 executes this program correctly; the Tandy 200 does not. The correct output would be:

```
0
              0
```

Notice the 13 spaces before the second zero. The PRINTUSING statement correctly inserts the extra spaces according to BASIC's rules of formatting.

The output on the Tandy 200 is:

```
 0
10000000000000
```

The ordinary PRINT statement correctly shows X to be equal to zero. A PRINTUSING statement claims that X is equal to ten-trillion. (One thing you can say about computers is that when they make mistakes, they make them big!) By the way, you may substitute the word FIX for the word INT and the same problem occurs.

Now substitute the following line for Line 20

```
20 PRINTUSING"#":X
```

Run the program again. The new output on the Tandy 200 is:

```
 0
%10000000000000
```

The % sign just means that the number printed was too huge to fit in the assigned format.

In general terms, Microsoft BASIC for the Tandy 200 makes an error any time you take the integer portion of any number less than one but greater than zero and then print the result with a PRINTUSING statement. The problem also occurs for numbers greater than negative one but less than zero.

It may be a while before a corrected version of Microsoft BASIC is available for the Tandy 200. Until then, you may compensate for the bug by rewriting the program as shown below:

```
10  X=INT (.1)
15  IF X=0 THEN X=0 :REM (This line
    is the fixup!)
20  PRINT X
30  PRINTUSING"################":X
```

In Line 15, X is being reassigned to zero. This seems to fix the problem with the PRINTUSING statement. PCM

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You just place the *Disk+* diskette into the desktop's drive and turn on the computer. It powers up automatically and says "awaiting command" on your desktop's screen. Then you just put the widebar cursor on the Model 100 main menu on *Disk+* and press ENTER. You are shown your RAM files arranged just like the main menu.

To save a file to your other system's disk drive, you just move the widebar cursor to the file you want to save and press ENTER. It is saved instantly with no further action.

To look at the disk directory, you just press a function key on your Model 100. You see immediately the disk directory on your Model 100 screen, and it is arranged just like your Model 100's main menu.

To load a file from the diskette to your Model 100, you just move the widebar cursor to the file and press ENTER. The file is transferred to your Model 100's RAM instantly. You can press F8 and go back to the main menu, and the file you loaded from diskette is there, ready to use.

It is so nice to be able to keep your documents, programs (both BASIC and machine code) and *Lucid* spreadsheet files on the diskette, and bring them back when you need them. All files are ready to run or use with no changes or protocol by you.

If you have access to a desktop computer and don't have *Disk+*, then evidently we have done a poor job telling you about it.

All files and programs that you load or save, go over and come back exactly as they are supposed to be because of full error checking. This guaranteed integrity is really a comfort. *Disk+* is wonderful in so many other ways. For example, you can do a "save all" of all your RAM files with just a touch of a function key. That group of files is saved on the diskette under a single filename with a .SD (for subdirectory) extension. Any time you want, you can bring back all those files at once, or just one or two if you like, again with one-button ease.

Disk+ takes up no RAM. That's zero bytes either for storing the program or for operating overhead.

What really excites most *Disk+* users is text file cross compatibility. Your Model 100's text files are usable on your desktop computer, and your desktop's text files become Model 100 text files.

This means you can write something on your Model 100, and with *Disk+* transfer it instantly to your desktop and start using it right away on your bigger computer. Or the way we like to work is to type in a document on the desktop computer and then transfer it to our Model 100 with *Disk+*. Then we print out the document, beautifully formatted, using WRITE ROM.

Disk+ works with just about every micro sold, from IBM PC and its clones, to all Radio Shack computers (yes, all), to Apple II, Kaypro, Epson and most CPM. Just ask us. More than likely, your computer is supported.

Incidentally, hundreds of Model 100 owners have gone to their Radio Shack stores and bought a color computer because it is so low priced, and with *Disk+* they have an inexpensive disk drive.

And if that weren't enough, how about this: *Disk+* also provides cross-compatibility between different computers like IBM, Apple or the Model 4 using the Model 100 as the intermediary device. Quite a feature!

The snap-in ROM is really great because you can use other ROMs like *Lucid* or WRITE ROM. They snap in and out as easily as an Atari game cartridge and you never lose your files in RAM.

Anyone who ever uses *Disk+* simply can't do without it. But so many times we have had new users call us and say, "Wow! I had no idea when I ordered it that *Disk+* would be so fantastic. I just couldn't believe that I could use my desktop computer's disk drive with my Model 100 just like it is another main menu."

That's why we sell *Disk+* on a thirty-day trial. If you aren't completely satisfied, return it within thirty days for a full refund. Priced at $149.95 on Snap-in ROM. MasterCard, Visa or COD.

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A no-frills word processor that is so quick and simple the author calls it an 'unprocessor'

The 'Tandy Typer'

By Bruce Blair

Not too long ago I picked up my new Tandy 2000 and my first software package, a big, high-powered word processor. I wanted it so my two teenagers could use it for their school work. It turned out that the word processor was so complicated that even my wife didn't want to use it for her college work; it looked like two or three months' work before she could master all the keys and commands necessary to write a simple letter. She may have been correct, but we'll never know because there was no way that she or the kids would spend that kind of time learning how to use any word processor. Since the computer was new and I needed to learn GW-BASIC anyway, I decided I would program a word processor in BASIC to help me master the new language and the new computer.

The result is a small word processor that is so simple to use it doesn't even need an instruction book. I don't even call it a word processor. I call it a word UNprocessor, and have named it the *Tandy Typer*. The basic goal was to duplicate an electric typewriter where possible and then add some functions that can only be done by a computer, i.e., document storage, full page editing, etc. Soon after I began, I came to realize that the basic instruction book that arrived with the 2000 was not an instruction book at all but an IQ test. Some of the guidelines and examples were either too brief or too complex to understand and, in some cases, exactly backward. If I was having problems with the book, then others would be too. It came to me that if I documented the program well, it would be of help to others who were battling their way through GW BASIC as well.

In effect, I wrote a small BASIC program that can be used as a tutorial. It is full of tricks that took weeks to ferret out of the books and get working in a BASIC program that can push the interpreter into high gear. Even running in BASIC, there is no keyboard lag as text and commands are entered. The program runs in screen mode 0,0. That is the fastest mode on the 2000 and is used where only text is being written to the screen. The little bit of graphics on the first few lines can be deleted if you like; mostly it was to show ways that simple line drawings could be done in BASIC with just a few lines of code. The actual program begins on Line 110 where a routine to alert the user that the printer needs attention is located. Once the printer is checked, the mode is set to text (screen 0,0) and the program starts.

Each line of code has a comment that explains what that line is doing, and in most cases, that will get the idea across. There is one area where special mention might help in lines 170 and 200. This relates to perhaps the most poorly documented part of the handbook: that part dealing with using assembly language subroutines.

To do assembly language subroutines, you first, need two things, the *Programmer's Reference Manual* (Cat. No. 26-5403) and the DEBUG utility located on the system disk and described in your DOS Handbook. The DATA lines 170 and 180 are very short assembly language programs to scroll the text either up (Line 170) or down (Line 180). Both of the functions are part of the BIOS Services (Basic Input/Output System) offered by MS-DOS and the 2000, and give the programmer simple ways to do very complicated things in assembly language.

If you can follow assembly language for the 80186 microprocessor, read on. But if assembly language gives you a headache then skip over this part. This particular BIOS command is INT 10h, "video display." For "scroll up," the manual reads:

Entry conditions:

AH	=	06h
AL	=	number of lines to scroll
CH	=	row of upper left corner of scroll window
CL	=	column of upper left corner

(Bruce Blair holds a bachelor's degree in electrical engineering. He is an electronics division manager and has been awarded several patents in the electronics field. He programs in several languages, but uses his Tandy 2000 for relaxation and therapy.)

of scroll window
DH = row of lower right corner of scroll window
DL = column of lower right corner of scroll window
BH = attribute to be used on blank lines

The only difference for scroll down is AH = 07h. Once the values are moved into the proper registers, an INT 10h is issued and the screen will scroll up or down.

This is done with OPP-CODE using the DEBUG utility "assembly" mode. Get into DEBUG, type: A100 ENTER, the screen will show some numbers and you type the following:

(See Figure 1.)

The next step is to enter the "dump" mode of DEBUG, type: D100 ENTER. The screen will fill with numbers and letters. For this short program, only the first row is of interest. Look across till you find CA 00 00; that's the machine code for RETF and tells you where your program ended.

Copy down all the numbers up through CA 00 00. They are B6 01 06 B9 00 00 BA 4F 17 CD 10 CA 00 00. To save space in *Tandy Typer* they are converted to decimal and become 184,1,6, 185,0,0,186,79,23,183,7, 205,16,202,0,0. These numbers are poked into memory by Line 190 and defined as SU and SD in Line 200. If you follow this guide, short machine language subroutines will work; if you follow what the handbook says, the 2000 will lose its mind, vanish into never-never land and you will have to re-boot.

Figure 1.

```
XXXX:0100 MOV AX,0601 ENTER     'AH=6, AL=1 scroll 1
XXXX:0103 MOV CX,0000 ENTER     upper left corner of window is row 0,
                                  col 0
XXXX:0106 MOV DX,174F ENTER     lower right corner to row 23, col 79
XXXX:0109 MOV BH,07 ENTER       attribute 7=normal
XXXX:010B INT 10 ENTER          BIOS interrupt #10h
XXXX:010D RETF ENTER            end, return to caller
XXXX:0110 ENTER                 ends assembly mode
```

Tandy Typer Tip

Lines 320, 330, 360, 370, 410 and 420 of TANDY.BAS contain graphics characters that do not accurately appear in the listing. To enter these characters from the keyboard, press and hold the ALT key while entering the following codes. Release the ALT key when you have entered the last digit of the code. For example, to enter the graphics code 219, you would hold ALT while typing 219 and then release ALT.

For Û type ALT 174
For £ type ALT 175
For ¥ type ALT 188
For à type ALT 200
For ü type ALT 207
For Ä type ALT 216
For Ü type ALT 219

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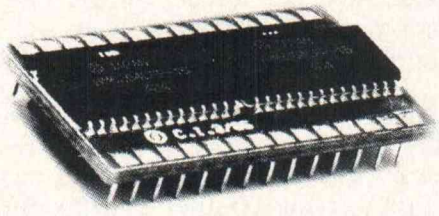

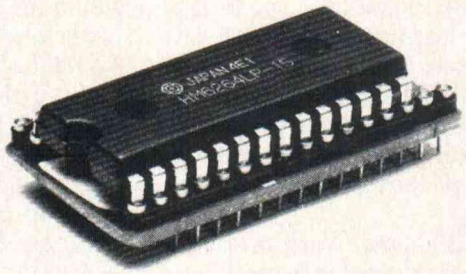

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This may seem like a lot of effort, but in BASIC the only way to shift a screenful of text up or down one line to make room for a new line, is to rewrite the entire screen. That's so slow in BASIC that it will put anyone to sleep. In machine language, using BIOS, the screen shifts up or down before you get your finger off the key. Slipping in and out of machine language using the CALL statement is very easy once you get the code poked into memory, and just one look at what can be done using BIOS will set your imagination reeling.

The rest of *Tandy Typer* is written in pure GW-BASIC and can be followed with the use of the comments on each line. Although *Tandy Typer* is straightforward, I've used every trick I know to make the program run faster. I didn't think that any BASIC language word processor could be fast enough to use, but on the super fast 2000 this one competes with most machine language word processors I've used.

A word or two about the program itself is in order before anyone tries to use it. First of all, it is not intended to compete with the major word processors on the market today. It can't merge, spell, wrap-around, search, repaginate or most of those neat things that a real word processor can do. This is a word UNprocessor and does only a few things that an electric typewriter can do. It has one sheet of paper that will hold 55 lines of print. When it's full you either have to print it or save it under some name you supply at the prompt. It does bring up a list of documents already saved, so you don't have to remember too much when saving or recalling. On the whole, it is user friendly, but one could spend a lot of time refining *Tandy Typer* so that it is friendlier. I'll leave that to someone else.

A brief description of the functions I included follows:

ESC — Turns on or off the help prompt line
F1(INDX) — Advances the paper one line (no return)
F2(Mar) — Moves the left margin to the left
F3(gin) — Moves the left margin to the right
F4(TAB) — Set or resets the tab at the cursor
F5(PRN) — Print the document (nondestructive)
F6(OLD) — Call an old document out of memory
F7(END) — Quit and save document (RUN to restart)
F8(DEL) — Removes an entire line
F9(INS) — Inserts a blank line
F10(Mar) — Moves the right margin to the right
F11(gin) — Moves the right margin to the left
F12(<EXP) — Returns cursor to left margin

That's not much, but at least you can remember them after one sitting. All the other editing keys work normally. I've had a lot of fun creating *Tandy Typer* and have removed all the bugs I could find; but no doubt there are more lurking around the corner. Sorry about that, but think of the experience you will get finding them yourself. □

The listing:

```
1 SCREEN 3:COLOR Ø,Ø:PALETTE 1,14:PALETTE 2,11:PALETTE 3,1Ø:PALETTE 4,13
2 PALETTE 4,13:PALETTE 6,9:PALETTE 7,15:PI=3.14:CLS:A$="T*A*N*D*YT*Y*P*E*R"
3 CIRCLE (1ØØ,24Ø),3Ø,3,PI/2,3*PI/2,4:CIRCLE (525,24Ø),3Ø,3,3*PI/2,3*PI/4,4
4 CIRCLE (115,24Ø),3Ø,3,PI/4,3*PI/2,4:CIRCLE (54Ø,24Ø),3Ø,3,3*PI/2,PI/2,4
5 CIRCLE (12Ø,24Ø),2Ø,3,PI/2,3*PI/2,4:CIRCLE (52Ø,24Ø),2Ø,3,3*PI/2,PI/2,4
6 CIRCLE (13Ø,24Ø),2Ø,7,PI/2,3*PI/2,4:CIRCLE (51Ø,24Ø),2Ø,7,3*PI/2,PI/2,4
7 LINE (1ØØ,21Ø)-(115,21Ø),3:LINE (525,21Ø)-(54Ø,21Ø),3
8 LINE (1ØØ,27Ø)-(115,27Ø),3:LINE (525,27Ø)-(54Ø,27Ø),3
9 LINE (12Ø,22Ø)-(13Ø,22Ø),3:LINE (51Ø,22Ø)-(52Ø,22Ø),3
1Ø LINE (12Ø,26Ø)-(13Ø,26Ø),3:LINE (51Ø,26Ø)-(52Ø,26Ø),3
11 DRAW"C7BM13Ø,22ØM2ØØ,7ØR24ØM51Ø,22ØBM51Ø,26ØL38Ø"
12 DRAW"C3BM12Ø,262R4ØØM55Ø,32ØL46ØM12Ø,262BM9Ø,32ØD3ØR46ØU3Ø"
13 LOCATE 16,3Ø:FOR I=Ø TO 8:CIRCLE (I*4Ø+16Ø,28Ø),15,3,,,.4
14 PRINT MID$(A$,I+1,1);:SOUND 47,.5:NEXT I
15 LOCATE 16,42:FOR I=Ø TO 8:CIRCLE (I*44+142,3ØØ),17,3,,,.4
16 PRINT MID$(A$,I+1Ø,1);:SOUND 47,.5:NEXT I
17 SOUND 72ØØ,5:LOCATE 23,4Ø:PRINT "Any key to start.....";:A$=INPUT$(1)
18 ' 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ
2Ø ' 2ØØØ                                                                  2ØØØ
3Ø ' 2ØØØ  #####   #   #   # ####  #   #    ##### #   # ####  ##### ####   2ØØØ
4Ø ' 2ØØØ    #    # #  #   # #   # #  #      #   #   # #   # #     #   #  2ØØØ
5Ø ' 2ØØØ    #   #   # ##  # #   #  # #      #    # #  #   # #     #   #  2ØØØ
6Ø ' 2ØØØ    #   ##### # # # #   #   #       #     #   ####  ####  ####   2ØØØ
7Ø ' 2ØØØ    #   #   # #  ## #   #   #       #     #   #     #     #  #   2ØØØ
8Ø ' 2ØØØ    #   #   # #   # ####    #       #     #   #     ##### #   #  2ØØØ
9Ø ' 2ØØØ                                                                  2ØØØ
1ØØ '2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ 2ØØØ
11Ø ON ERROR GOTO 13Ø:LPRINT CHR$(2Ø);CHR$(27);CHR$(18);    'set up to catch any
12Ø WIDTH LPRINT 8Ø:GOTO 16Ø                                  'problems with the
13Ø IF ERR=68 THEN CLS:LOCATE 12,3Ø:COLOR 18,Ø   'printer at turn on...paper or
14Ø PRINT "PRINTER NEEDS PAPER";                              'off line,etc
15Ø SOUND 72ØØ,2:FOR I=1 TO 5ØØØ :NEXT I:RESUME 11Ø    'this repeats till fixed
16Ø ON ERROR GOTO 163Ø                                        'new error handeler
```

```
17Ø DATA 184,1,6,185,Ø,Ø,186,79,23,183,112,2Ø5,16,2Ø2,Ø,Ø
18Ø DATA 184,1,7,185,Ø,Ø,186,79,23,183,7,2Ø5,16,2Ø2,Ø,Ø
19Ø FOR I=6528Ø! TO 65311!:READ A:POKE I,A:NEXT I    'machine language code for
2ØØ SU=6528Ø!:SD=65296!                              'fast up and down scrolls
21Ø SCREEN Ø,Ø:DIM X$(56):COLOR Ø,7:S=Ø   'go to alpha screen..set up variables
22Ø LM=1Ø:RM=7Ø:X=1:B=Ø:KEY OFF:CLS                  ' X$----------text array
23Ø '                                                 S----------help toggle
24Ø '                                                 LM---------left margin
25Ø '                                                 RM---------right margin
26Ø '                                                 X----------line counter
27Ø '                                                 P------position counter
28Ø '                                                 B----insert mode toggle
29Ø '                                                 U$,U1$-------line scale
3ØØ '                                                 U3$------help line text
31Ø '                                                 U4$---------trap CHR$'s
32Ø U3$="INDX ÜÛ MarÜgin £Ü Tab ÜÜÜÜÜ PRN Ü OLD "                 'help key line
33Ø U3$=U3$+"Ü END Ü DEL ÜÜÜÜÜ INS ÜÛ MarÜgin £Ü<EXP< "    'called with ESC key
34Ø U4$=CHR$(9)+CHR$(27)+CHR$(28)+CHR$(29)+CHR$(3Ø)+CHR$(31)+CHR$(127)  'string
35Ø FOR I=1 TO 12:KEY I,CHR$(13Ø+I):U4$=U4$+CHR$(13Ø+I):NEXT I 'to catch F keys
36Ø X$(Ø)="ÜÜÜÜÜ
```

```
83Ø X$(X)=MID$(X$(X),1,P-2)+MID$(X$(X),P,8Ø-P)+"  " 'split and delete at cursor
84Ø LOCATE 24,P-1:PRINT MID$(X$(X),P-1,81-P);:LOCATE 24,P-1:GOTO 47Ø   'reprint
85Ø '------ENTER KEY-----------------------------------------------------
86Ø IF X=55 THEN 47Ø                                          'don't pass line 55
87Ø IF X$(X+1)<>"" THEN 89Ø                                 'if not last line go around
88Ø X=X+1:PRINT:X$(X)=STRING$(8Ø,32):GOTO 46Ø               'new line, fill with spaces
89Ø X=X+1:PRINT X$(X);:GOTO 46Ø                               'old line just print it
9ØØ '------SCROLL UP-------------------------------------------------------
91Ø IF X$(X+1)="" OR X>54 THEN 47Ø ELSE CALL SU:X=X+1  'scroll if not last line
92Ø LOCATE 24,1:PRINT X$(X);:GOTO 97Ø                 'print bottom line after scroll
93Ø '------SCROLL DOWN-----------------------------------------------------
94Ø IF X=1 THEN 47Ø                                           'if first line go back
95Ø IF X<24 THEN CALL SD:X=X-1:GOTO 97Ø       'if less than 24 lines,just scroll
96Ø CALL SD:LOCATE 1,1:PRINT X$(X-24);:X=X-1 'lines above, scroll and print top
97Ø COLOR 15,Ø:LOCATE 25,1:PRINT USING "## ";X;:COLOR Ø,7:LOCATE 24,P:GOTO 47Ø
98Ø '------HELP LINE PRINT/UNPRINT-------------------------------------------
99Ø IF S=Ø THEN S=1:GOTO 1Ø1Ø ELSE S=Ø:LOCATE 25,1:COLOR 15,Ø'set or unset help
1ØØØ PRINT U$;:COLOR Ø,7:GOTO 1Ø2Ø                                'print scale
1Ø1Ø LOCATE 25,1:COLOR 15,Ø:PRINT U3$;:COLOR Ø,7                 'print help list
1Ø2Ø LOCATE 24,P:GOTO 47Ø                                        'go back
1Ø3Ø '------LEFT AND RIGHT MARGIN CONTROL-----(F-2,F-3,F-1Ø,F-11)-------------
1Ø4Ø IF LM<RM-5 THEN RM=RM-1:GOTO 1Ø8Ø ELSE GOTO 47Ø   'don't let margins cross
1Ø5Ø IF RM<79 THEN RM=RM+1:GOTO 1Ø8Ø ELSE GOTO 47Ø   'keep right margin on page
1Ø6Ø IF LM>1 THEN LM=LM-1:GOTO 1Ø8Ø ELSE GOTO 47Ø    'keep left margin on page
1Ø7Ø IF LM<RM THEN PRINT CHR$(29);:LM=LM+1:GOTO 1Ø8Ø ELSE GOTO 47Ø 'don't cross
1Ø8Ø U$=U1$:MID$(U$,LM,1)=CHR$(62):MID$(U$,RM,1)=CHR$(6Ø):S=Ø   'put into scale
1Ø9Ø LOCATE 25,1:COLOR 15,Ø:PRINT U$:COLOR Ø,7:LOCATE 24,P:GOTO 47Ø   'reprint
11ØØ '------TAB CONTROL, SET IF NOT SET OR REMOVE IF SET--(F-4)---------------
111Ø IF P=LM THEN 47Ø                                         'no tab at margin
112Ø IF MID$(U$,P,1)=CHR$(24) THEN 114Ø                'if tab this spot, take it out
113Ø MID$(U$,P,1)=CHR$(24):GOTO 1Ø9Ø                     'no tab here, put one in
114Ø MID$(U$,P,1)=MID$(U1$,P,1):GOTO 1Ø9Ø                          'now its gone
115Ø '------TAB ----------------------------------------------------------
116Ø A=INSTR(P+1,U$,CHR$(24)):IF A=Ø THEN LOCATE 24,P:GOTO 47Ø   'find next tab
117Ø LOCATE 24,A:GOTO 47Ø                              'if none goback,else go there
118Ø '------SAVE DOCUMENT-----(F-7)-------------------------------------------
119Ø FOR I=1 TO 1Ø:CALL SU:NEXT I                              'scroll up 1Ø lines to
12ØØ LOCATE 16,1:FILES "*.DOC"                        'clear place for document list
121Ø LOCATE 25,1:COLOR 15,Ø:PRINT SPACE$(8Ø);                  'clear space to print
122Ø LOCATE 25,1:LINE INPUT;"    What name for file? "; A$   'get new file name
123Ø IF A$<>"" THEN 125Ø                                              'no name
124Ø COLOR Ø,7:CLS:LOCATE 13,3Ø:PRINT " GOOD-BY ";:END                 'no save
125Ø OPEN "R",1,A$+".DOC",8Ø:Y=1                             'open or create file
126Ø FIELD 1,8Ø AS DOC$                                       'inentify buffer
127Ø IF X$(Y)="" OR Y=56 THEN LSET DOC$=CHR$(126):PUT 1,Y:CLOSE 1:GOTO 129Ø
128Ø LSET DOC$=X$(Y):PUT 1,Y:Y=Y+1:GOTO 127Ø                  'no, put it on disk
129Ø COLOR Ø,7:CLS:LOCATE 13,3Ø:PRINT " ";A$;" IS SAVED. GOOD-BY ";:END    'end
13ØØ '------INDEX------------(F-1)-------------------------------------------
131Ø IF X=55 THEN 47Ø                                         'don't pass line 55
1315 IF X$(X+1)<>"" THEN 132Ø                               'if not last line go around
1317 X=X+1:PRINT:X$(X)=STRING$(8Ø,32):GOTO 1322           'new line, fill with spaces
132Ø X=X+1:PRINT X$(X);                                       'old line just print it
1322 LOCATE 25,1:COLOR 15,Ø:PRINT USING "## ";X;:COLOR Ø,7:LOCATE 24,P:GOTO 47Ø
133Ø '------OLD, CALL SAVED DOCUMENT FROM FILE--------(F-6)-------------------
134Ø FOR I=1 TO 1Ø:CALL SU:NEXT I                              'scroll up 1Ø lines to
135Ø LOCATE 16,1:FILES "*.DOC"                        'clear place for document list
136Ø LOCATE 25,1:COLOR 15,Ø:PRINT SPACE$(8Ø);          'clear line to print mesage
137Ø LOCATE 25,1:LINE INPUT;"    What name? "; A$              'get name of file
138Ø IF A$<>"" THEN 143Ø                                'null entry returns to typer
139Ø COLOR Ø,7:X2=1Ø:X1=X                                     'scroll back down
14ØØ CALL SD:IF X1<14 THEN:GOTO 142Ø                        'and replace text if
141Ø LOCATE 1,1:PRINT X$(X1-14);:X1=X1-1                              'needed
142Ø X2=X2-1:IF X2=Ø THEN 45Ø ELSE 14ØØ          'this only happens if null entry
143Ø COLOR Ø,7:OPEN "R",1,A$+".DOC",8Ø:FIELD 1,8Ø AS DOC$:X=1  'identify buffer
144Ø FOR I=1 TO 55:X$(I)="":NEXT I                            'clear text array
145Ø GET 1,X:IF ASC(DOC$)=126 OR X=56 THEN CLOSE 1:X=X-1:GOTO 45Ø   'is it end?
```

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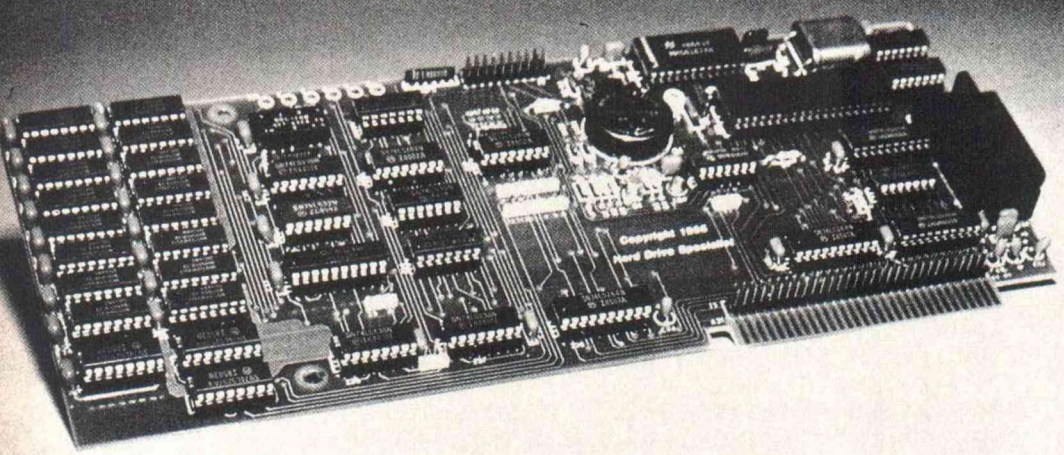

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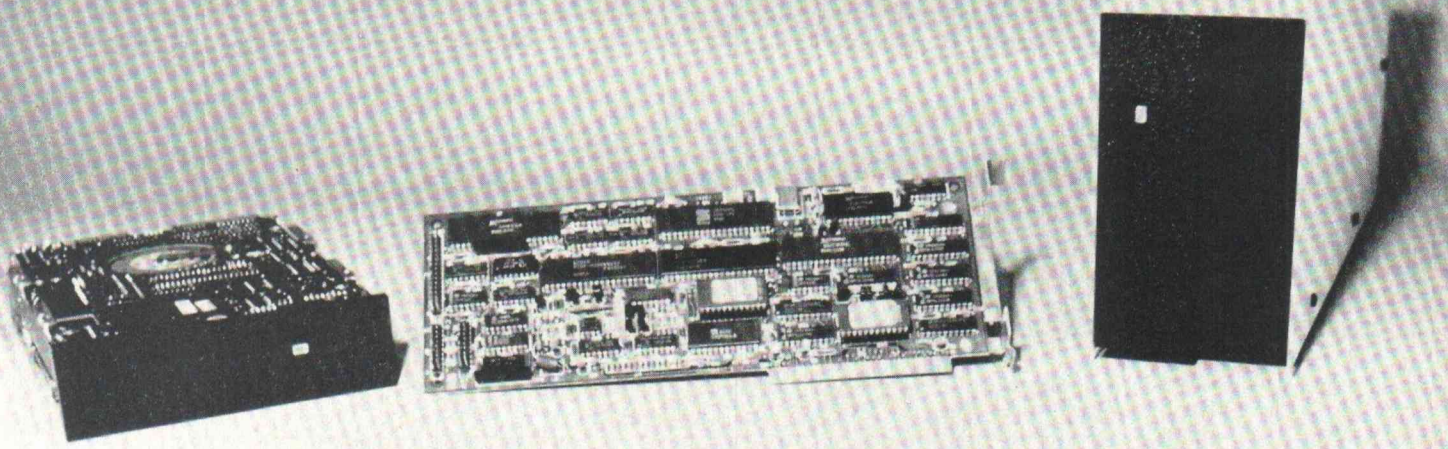

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```
146Ø X$(X)=DOC$                                          'no, send to text array
147Ø LOCATE 24,1:PRINT:PRINT X$(X);:X=X+1:GOTO 145Ø   'and then print it on CRT
148Ø CLOSE 1:LOCATE 24,LM:GOTO 45Ø                       'last line, close file
149Ø '------PRINT THIS DOCUMENT----------------------(F-5)--------------------
15ØØ FOR I=1 TO 55:LPRINT X$(I):NEXT I:GOTO 45Ø       'print first to last line
151Ø '------LINE DELETE-----------------------------(F-8)--------------------
152Ø I=X:IF X$(X+1)="" OR X=55 THEN 47Ø                  'go back if last line
153Ø X$(I)=X$(I+1):I=I+1                  'cycle through, move each line up one
154Ø IF X$(I+1)="" OR I=55 THEN X$(I)=SPACE$(8Ø):GOTO 94Ø     'blank last line
155Ø GOTO 153Ø                                          'back for next line
156Ø '------LINE INSERT-----------------------------(F-9)--------------------
157Ø I=X:IF X=55 THEN 47Ø                          'if bottom of page, go back
158Ø IF X$(I+1)<>"" THEN I=I+1:GOTO 158Ø                 'find first empty line
159Ø FOR I=I TO X-1 STEP -1:X$(I+1)=X$(I):NEXT I       'move each line down one
16ØØ X$(X)=SPACE$(8Ø):LOCATE 24,1:PRINT X$(X);:LOCATE 24,LM:GOTO 47Ø'blank line
161Ø GOTO 47Ø                                                       'return
162Ø '------ERROR CONTROL-------------------------------------------------------
163Ø COLOR 15,Ø:LOCATE 25,1:PRINT SPACE$(8Ø);:LOCATE 25,3   'clear message line
164Ø PRINT "Any key to continue.  ";                'print first part of message
165Ø IF ERR=53 THEN 172Ø                                              'find
166Ø IF ERR=58 THEN 173Ø                                              'out
167Ø IF ERR=61 THEN 174Ø                                              'what
168Ø IF ERR=64 THEN 175Ø                                              'error
169Ø IF ERR=68 THEN 176Ø                                              'occured
17ØØ COLOR Ø,7:ON ERROR GOTO Ø                  'return error handeling to BASIC
171Ø END                                      'errors not handeled will end program
172Ø BEEP :PRINT "FILE NOT FOUND";:COLOR Ø,7:A$=INPUT$(1):RESUME 134Ø      'old
173Ø BEEP :PRINT "FILE ALREADY EXIST";:COLOR Ø,7:A$=INPUT$(1):RESUME 118Ø 'save
174Ø BEEP :PRINT "THIS DISK IS FULL";:COLOR Ø,7:A$=INPUT$(1):RESUME 118Ø  'save
175Ø BEEP :PRINT "BAD FILE NAME";:COLOR Ø,7:A$=INPUT$(1):RESUME 118Ø      'save
176Ø BEEP :PRINT "PRINTER NEEDS HELP";:COLOR Ø,7:A$=INPUT$(1):RESUME 15ØØ'print
```

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PCM

Adding Reports and Labels to our Mailing List Program

By Danny Humphress

Our very first dBASE II programming project is coming along quite nicely. Last month, we began the project by defining the problem and designing a system to get the job done. We then set up the database file and coded the first section of the system — the program for entering and editing names and addresses.

Today, we will add the other two major portions of the mailing list system: a report program and a program to print labels.

For those of you who may have missed the first part of this series, the structure and indexes for the database file appear in Figure 1; Figure 2 is the screen format file and Figure 3 is the add/edit program.

Report Program

Fortunately, dBASE II's REPORT FORMAT command provides a simple method for producing reports (see the October '84 "dBASE Tutor"). REPORT FORMAT can handle most simple reports, such as the one we propose to do, but it does have its limitations. For instance, it cannot produce reports with more than one line per record, and it does not have the ability to automatically look up records in more than one indexed database (dBASE III does have the latter capability). However, it will work for our application.

If you were designing a report to be used by yourself or another person who is familiar with dBASE commands, your job would be finished after you design the report with REPORT FORMAT. Then, you could just open the database and index files with USE, turn the printer on with SET PRINT ON and print the report with REPORT FORMAT. Our application, however, is intended to be menu-driven and usable by persons unfamiliar with dBASE commands. Therefore, we will need to design a program to do the things that we would normally do from the dBASE dot prompt and add a touch of user-friendliness to the procedure.

In addition to turning on the printer and printing the report, the report program should allow the user to print the list in either name or ZIP code order. It should also give the user the opportunity to abort the program before printing begins in case he or she accidentally selected it from the menu.

The first step is to design the report format with, logically enough, the REPORT FORMAT command. We'll call the report format MAILLIST.FRM. The format appears in Figure 4. For more information on creating report formats, see the October '84 "dBASE Tutor."

Now on to the program! We'll call it MAILLIST.PRG. The listing appears in Figure 5. Remember, don't type in the line reference numbers.

MAILLIST.PRG Line by Line

The first six lines of MAILLIST.PRG, like those in last month's program, set up the operating parameters for dBASE.

The eighth line displays a message on the screen at row 10, column 20, telling the user what the program is about to do.

Lines nine through 15 ask the user if they want to continue. The DO WHILE loop in Line 10 causes the question to be repeated until the person answers with a 'Y' or an 'N'; that is, the loop will run as long as ANSWER<>'Y' and ANSWER<>'N'. Line nine initializes the ANSWER variable as a single blank.

Lines 16 and 17 simply clear the two previous messages from the screen.

If the user answers 'N', the IF at lines 19 and 20 will catch it and return control to the dBASE dot prompt. If this program had been run from another program, such as a menu, control would return to that program.

Lines 23 through 30 are very similar to the above "yes/no" loop. This loop asks the user about how he or she wants the list sorted. Depending upon how

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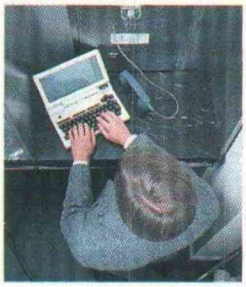

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NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE _____

the user answers, 'Z' for ZIP, or 'N' for name, the proper index will be selected. Again, the loop will continue until the person answers with a 'Z' or an 'N'.

Lines 32 through 36 contain another IF routine. This routine, however, uses a new dBASE command — ELSE. In this case, if ORDER='N', then the MAIL file is opened with the MAILNAME index, *else* the MAIL file is opened with the MAILZIP index. The statements following the ELSE in an IF routine will be executed if the condition in the IF line is not true.

Line 38 has our program tell the user that the printing has begun.

Line 39 turns the screen display off so that the report will not appear on the screen.

Line 40 is our old friend, REPORT FORM. This time we've added TO PRINT at the end to direct the output to the printer. TO PRINT is a special clause-supported REPORT FORM that will automatically route the output to the printer.

Line 41 turns screen display back on

Line 48 closes the file.

Finally, Line 44 returns control to the dBASE prompt or the parent program.

Now might be a good time to mention about how some program lines are indented. While these indentations are not necessary to the operation of the program, they make the listing much easier to read and understand. It is customary to indent the statements within a DO/WHILE loop and statements within an IF/ELSE/ENDIF routine.

MAILLABL.PRG

With the report program behind us, let's move on to the label printer. dBASE II does not have a built-in command for printing labels as it does for printing reports. However, because of the programmability of dBASE, we can write our own program to do the job.

The program, called MAILLABL.PRG, will use standard "one-up" mailing labels — only one label across. Most mailing labels are spaced six lines apart, so we'll make the program conform to that standard. Since it is difficult to get the labels aligned in the printer the first time, we'll allow the user to print as many sample labels as required to gain proper alignment.

The listing for MAILLABL.PRG appears in Figure 6.

The first 37 lines of MAILLABL.PRG, except for the text in Line 8, are exactly like the corresponding lines in MAIL LIST.PRG. They set up dBASE operating conditions, tell the user what's going on, and give the user a chance to get out of the program.

Lines 38 through 60 are a loop that continues until the person answers 'N' (no) for printing sample labels. Within the loop, at lines 44 through 55, is an IF/ENDIF routine that will print a sample label if the user answered 'Y' (yes).

Notice how the lines within this IF/END are indented another three spaces. This, again, is done for clarity.

Lines 45 and 46 turn the printer on and the screen display off so the sample label goes to the printer and not the screen.

Lines 47 through 49 print three rows of X's on the printer to show where the body of the label will go.

Lines 50 through 52 print blank lines to move the print head down to the next label. The three lines of X's and these three blank lines total six — the total number of lines on a label.

When the user drops out of the sample label loop by answering 'N', dBASE moves on to the 59th line where

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it displays a "printing" message, turns the printer on and turns the display off.

The loop in lines 63 through 71 actually does the printing of the labels. It will continue to loop through, printing labels and skipping to the next record, until the EOF( ) function is true. EOF( ) is a function that is internally maintained by dBASE. EOF( ) is true when you have gone beyond the end of a file. DO WHILE .NOT. EOF( ), therefore, would loop while you have not gone beyond the end of the file.

All that remains to do now is to turn the printer off, console on, close the file and return to dBASE dot prompt.

Next month we wrap up our mailing list system by putting the three programs together into one menu-driven system. Until then, you might want to experiment a bit with the programs we've done so far. Try changing them around by adding fields, printing on different size labels, etc. Dive in! □

Figure 1:

```
STRUCTURE FOR FILE:  C:MAIL     .DBF
NUMBER OF RECORDS:   ØØØØØ
DATE OF LAST UPDATE: Ø8/Ø1/85
PRIMARY USE DATABASE
FLD       NAME       TYPE WIDTH   DEC

ØØ1       NAME          C    Ø3Ø
ØØ2       STREET        C    Ø3Ø
ØØ3       CITY          C    Ø15
ØØ4       STATE         C    ØØ2
ØØ5       ZIP           C    Ø1Ø
ØØ6       PHONE         C    Ø13
** TOTAL **                 ØØ1Ø1

. INDEX ON NAME TO MAILNAME
. INDEX ON ZIP TO MAILZIP
```

Figure 2:

```
@ 1Ø,15 say 'Name:    ' get NAME
@ 12,15 say 'Street: ' get STREET
@ 14,15 say 'City:    ' get CITY
@ 14,39 say 'State: ' get STATE picture '!!'
@ 14,49 say 'ZIP: ' get ZIP picture '99999 9999'
@ 16,15 say 'Telephone Number: ' get PHONE picture '(999)999-9999'
```

Figure 3:

```
set talk off
set colon off
set confirm on
set bell off

use MAIL index MAILNAME,MAILZIP

erase

do while T
```

```
    store ' ' to ANSWER
    erase
    @ 2Ø,25 say 'Select: [A]dd [E]dit e[X]it ';
    get ANSWER picture '!'
    read
    clear gets
    @ 2Ø,Ø

    if ANSWER='A'
       set format to MAILEDIT
       append
       set format to
    endif

    if ANSWER='E'
       store '                    (30 spaces)                    ' to SEARCH
       @ 2Ø,19 say 'Enter name: ' get SEARCH
       read
       clear gets
       store trim(SEARCH) to SEARCH
       find &SEARCH
       if #=Ø
          @ 21,18 say 'Name not found.  Press any key to continue.'
          set console off
          wait
          set console on
          loop
       endif
       set format to MAILEDIT
       edit #
       set format to
    endif

    if ANSWER='X'
       use
       return
    endif

 enddo
```

Figure 4:

```
ENTER OPTIONS, M=LEFT MARGIN, L=LINES/PAGE, W=PAGE WIDTH M=10,W=132
PAGE HEADING? (Y/N) Y
ENTER PAGE HEADING: Mailing List Report
DOUBLE SPACE REPORT? (Y/N) N
ARE TOTALS REQUIRED? (Y/N) N
COL       WIDTH,CONTENTS
001       30,NAME
ENTER HEADING: <Name
002       30,STREET
ENTER HEADING: <Street
003       15,CITY
ENTER HEADING: <City
004       2,STATE
ENTER HEADING: <St
005       10,ZIP
ENTER HEADING: <ZIP Code
006       13,PHONE
ENTER HEADING: <Telephone
```

Figure 5:

```
set talk off
set colon off
set confirm on
set bell off

erase

@ 10,20 say 'Preparing to print mailing list report.'
store ' ' to ANSWER
do while (ANSWER<>'Y' .and. ANSWER<>'N')
   store 'N' to ANSWER
   @ 12,27 say 'Do you want to continue? ' get ANSWER picture '!'
   read
   clear gets
enddo
@ 10,0
@ 12,0

if ANSWER='N'
   return
endif

store ' ' to ORDER
do while ORDER<>'N' .and. ORDER<>'Z'
   store 'N' to ORDER
   @ 12,22 say 'Sort the list by [N]ame or [Z]ip? ' get ORDER picture '!'
   read
   clear gets
enddo
@ 12,0

if ORDER='N'
   use MAIL index MAILNAME
else
   use MAIL index MAILZIP
endif

@ 12,34 say 'Printing...'
set console off
report form MAILLIST to print
set console on

use
return
```

Figure 6:

```
set talk off
set colon off
set confirm on
set bell off

erase

@ 10,23 say 'Preparing to print mailing labels.'
store ' ' to ANSWER
do while (ANSWER<>'Y' .and. ANSWER<>'N')
   store 'N' to ANSWER
   @ 12,27 say 'Do you want to continue? ' get ANSWER picture '!'
   read
   clear gets
```

```
enddo
@ 1Ø,Ø
@ 12,Ø

if ANSWER='N'
   return
endif

store ' ' to ORDER
do while ORDER<>'N' .and. ORDER<>'Z'
   store 'N' to ORDER
   @ 12,22 say 'Sort the list by [N]ame or [Z]ip? ' get ORDER picture '!'
   read
   clear gets
enddo
@ 12,Ø

if ORDER='N'
   use MAIL index MAILNAME
else
   use MAIL index MAILZIP
endif

store ' ' to ANSWER
do while ANSWER<>'N'
   store 'N' to ANSWER
   @ 12,24 say 'Do you want to print a sample? ' get ANSWER picture '!'
   read
   clear gets
   if ANSWER='Y'
      set print on
      set console off
      ? 'XXXXXXXXXXXXXXXXXXXXXXXXX'
      ? 'XXXXXXXXXXXXXXXXXXXXXXXXX'
      ? 'XXXXXXXXXXXXXXXXXXXXXXXXX'
      ?
      ?
      ?
      set print off
      set console on
   endif
enddo
@ 12,Ø

@ 12,34 say 'Printing...'
set print on
set console off

do while .not. eof()
   ? NAME
   ? STREET
   ? trim(CITY)+', '+STATE+' '+ZIP
   ?
   ?
   ?
   skip
enddo

set print off
set console on

use
return
```

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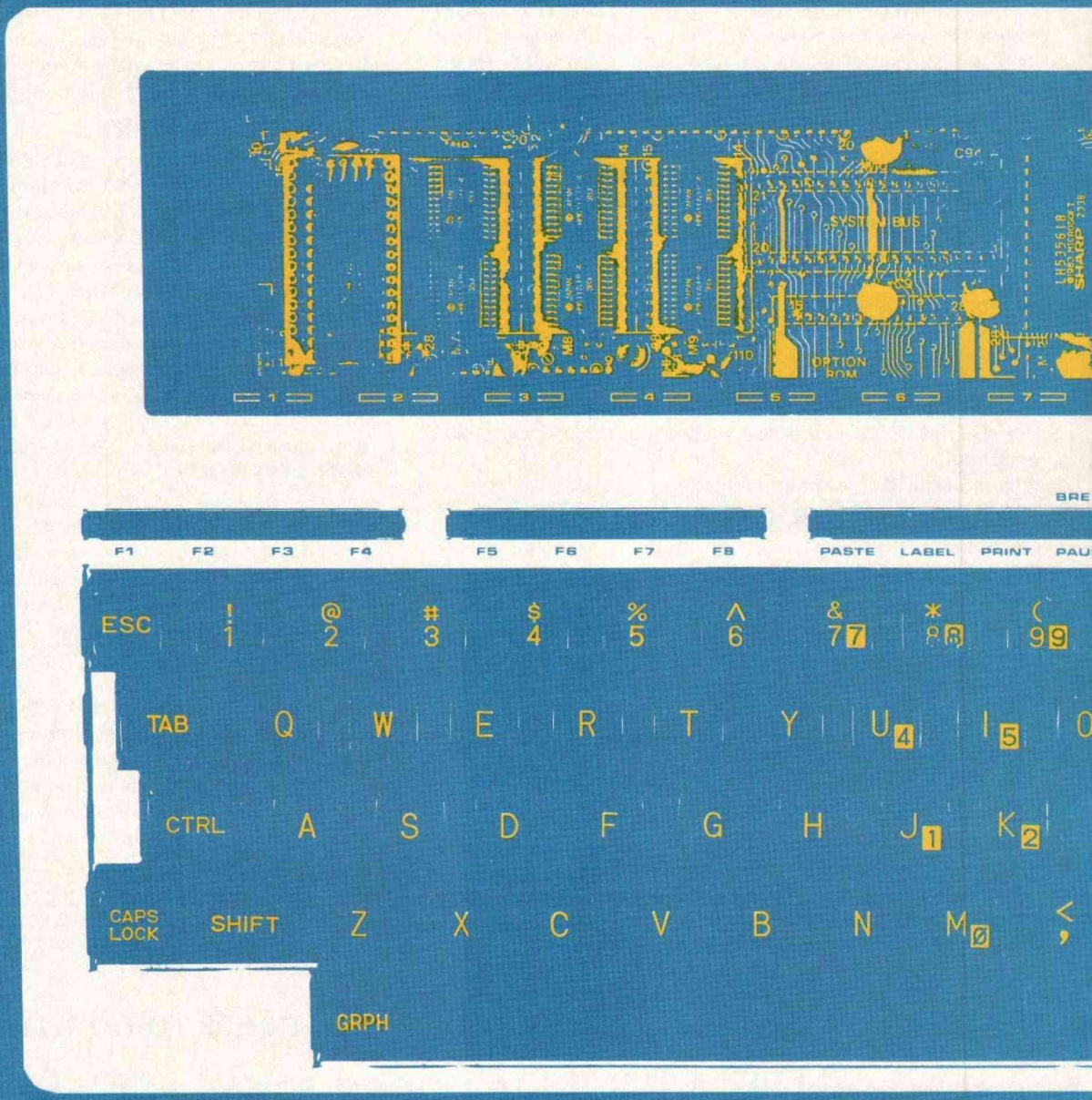

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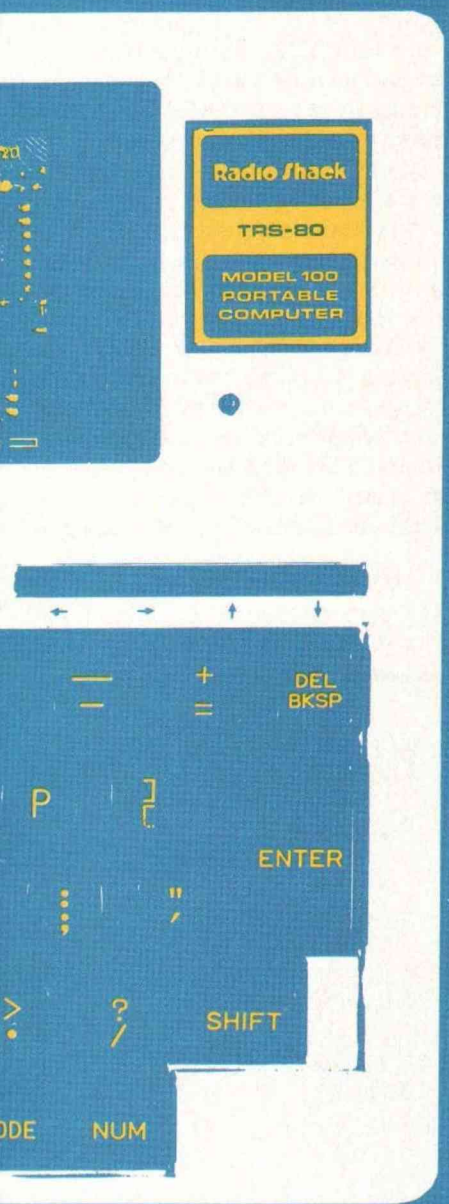


By John F. Teague

As is usual in computer programming, the justification for using machine language is speed. *SMS* (Screen to Memory to Screen) is a machine language routine for the Model 100 which can be called by a BASIC program to save a graphics screen to memory and later restore the screen, and perform both operations with gratifying rapidity. Absolutely anything which is displayed on the screen can be saved and restored using *SMS*. In its present version, it operates on the entire screen with no option to select a smaller portion. Two thousand bytes of RAM are required to store each screen, but you may have as many screens as will fit in available memory.

In this article, BASIC programs are given which:

- create and save the object code file.
- illustrate the use of the routine to save multiple screens.
- restore the screens using *SMS*.
- restore the same screens using the PSET command to demonstrate the relative speed of the machine language routine.

In addition, the Assembler source is provided and its workings discussed for those who would like to enhance the program or merely relocate it.

Loading the Object Code

Listing 1 is a BASIC program, titled SMSPOK, which will poke the machine language program into high memory.

Before running SMSPOK, take the precaution of saving it and all other files to cassette or disk. Anytime you run a machine language program the first time, you risk losing the file in memory because an error in keying a single instruction can totally change the operation of the program. But this is no crisis if the files are backed up. Nevertheless, SMSPOK performs a checksum on the data statements and will give an error message if the checksum is incorrect. In this case, the program is aborted even before any poking takes place. If you get the message that the checksum is incorrect, check the data statements and the value that is being tested for.

SMSPOK also gives the option to save the object file to memory or cassette. Then the file can be loaded with the LOADM "SMS" or CLOADM "SMS" commands. However, memory above 62855 must first be reserved with the CLEAR command.

Using the Routine

Once the machine language routine is in memory, the BASIC statement to save the screen to memory is

```
CALL 62855, 1, ma
```

where ma is the starting address of 2000 bytes of storage which you have reserved with the BASIC CLEAR statement. To restore the screen, the entry is:

```
CALL 62855,0,ma
```

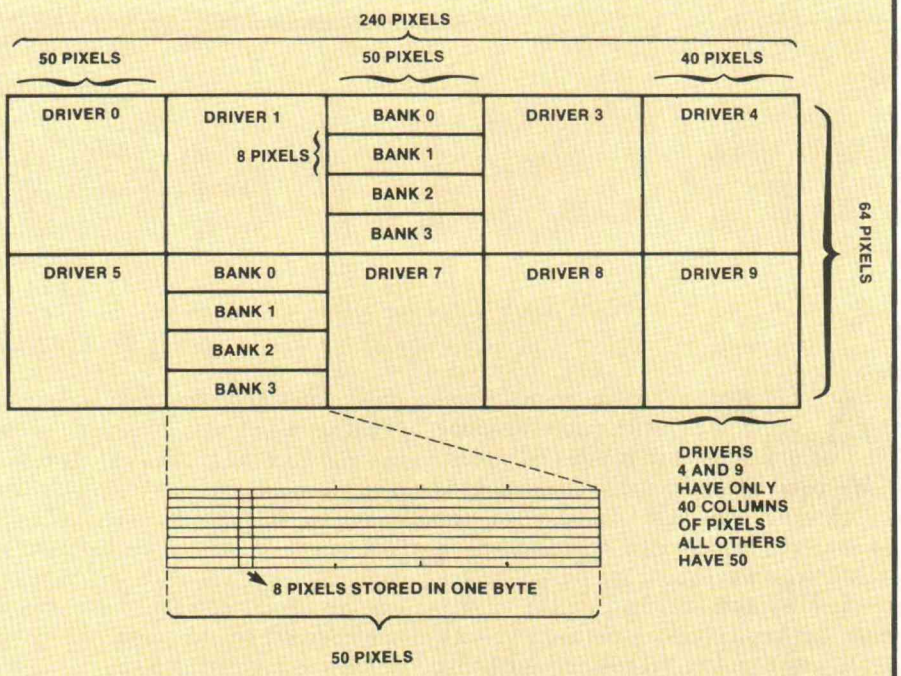
The only difference between the two CALLs is in the second operand, the A-Register, which is zero to write the information from memory to the LCD screen and non-zero to read the information from the screen and store it in memory. Listings 2 and 3 illustrate the process.

Listing 2 creates and saves two different screens of information. After Listing 1 has been successfully run, simply type and run Listing 2 to save the screens.

Listing 3 alternately displays the two

(John Teague is a systems analyst who has programmed in a variety of high- and low-level languages during his 13 years in data processing. He maintains a complex love/hate relationship with the BASIC language.)

Figure 1. Organization Of LCD RAM



screens that have been saved. Run the program and then press any key to see the next screen. CTRL C must be used to exit this program.

Listing 4 performs the same function as Listing 3, except that it uses the BASIC PSET and PRESET commands instead of *SMS*. Listing 2 must have been run first. If you run Listing 4, be prepared to be patient.

As written, *SMS* must be loaded at address 62855. If you have an assembler for the Model 100, you can use the source code in Listing 5 to relocate the routine or otherwise modify it.

LCD RAM

The actual bit patterns which appear on the LCD are not normally stored within the Model 100's 32K of RAM. Yes, there is an area of 320 bytes that contains a record of the text characters on the screen and, yes, the PEEK command will identify the text characters. However, 320 bytes is not sufficient space to store all the possible bit patterns. Actually, 1,920 bytes are required. If you multiply 1,920 by 8 bits per byte, you obtain 15,360 bits. Similarly, if you consider that there are 240 pixels horizontally and 64 pixels vertically that can be addressed with the PSET BASIC command and multiply 240 by 64, you again obtain 15,360. Divide 15,360 by 8 (bits per byte) and you obtain 1,920 bytes. This 1,920 bytes of LCD RAM is not part of the Model 100's 64K memory space at all but is part of the LCD device. It cannot be addressed with PEEK or POKE commands, but it can be accessed indirectly through INP and OUT commands and their machine language counterparts. In order to do this, it helps to know how this LCD RAM is organized with respect to the pixels on the screen.

The Screen is divided into 10 drivers, numbered from zero to nine (see Figure 1). Each driver is further divided into four banks, numbered from zero to three. Each bank contains 50 bytes and each byte contains eight bits. Each of the bits corresponds to one pixel. If the bit is one, the pixel is on. If the bit is zero, the pixel is off. For Drivers 4 and 9, only 40 bytes per bank are "connected" to pixels. This means that, in a sense, we are wasting 80 bytes of memory when we reserve 2,000 bytes, but it simplifies the logic somewhat. It is left as an exercise to the reader to make this memory saving enhancement.

How *SMS* Works

SMS uses several of the Model 100 ROM routines. The heart of the *SMS*

PCM BAR CODED LISTING

The listing: SMSPOK.BA

```
Ø GOTO1ØØ'smspok 5/1/85
1ØØ CLEAR 1ØØ,62855
11Ø FOR I=62855 TO 62959
115 READ X
13Ø XT =XT+X
16Ø NEXT
17Ø PRINT "checksum="XT
175 XC=13164
176 IF XT=XCTHEN 2ØØ
18Ø PRINT"checksum ="XT;" Should be ";XC
19Ø LIST 18Ø-19Ø
2ØØ RESTORE
21Ø FOR I=62855 TO 62959
215 READ X
22Ø POKE I,X
23Ø XT =XT+X
26Ø NEXT
27Ø PRINT"<S>avem "+CHR$(34)+"SMS"+CHR$(
34)" <C>savem"+CHR$(34) "SMS"+CHR$(34)"
or <Q>uit?
28Ø A$=INPUT$(1)
29Ø A=INSTR ("SsCcQq",A$)
3ØØ ON A GOTO 51Ø,51Ø,52Ø,52Ø,53Ø,53Ø
31Ø GOTO 27Ø
51Ø SAVEM "sms",62855,62959,62855
511 END
52Ø CSAVEM "sms",62855,62959,62855
521 END
53Ø END
62855 DATA 34, 149, 245, 5Ø, 148
6286Ø DATA 245, 2Ø5, 92, 118, 195
62865 DATA 187, 245, Ø, Ø, Ø
6287Ø DATA Ø, Ø, Ø, 42, 151
62875 DATA 245, 2Ø5, 59, 117, 17
6288Ø DATA 5Ø, Ø, 42, 149, 245
62885 DATA 58, 148, 245, 246, Ø
6289Ø DATA 2Ø5, 247, 116, 2Ø5, 92
62895 DATA 118, 42, 149, 245, 17
629ØØ DATA 5Ø, Ø, 25, 34, 149
629Ø5 DATA 245, 2Ø1, 33, 67, 118
6291Ø DATA 34, 151, 245, 62, 1Ø
```

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routine is the call to the ROM Routine at 29943 decimal. (Line 260.) Depending upon the contents of the A-register and flags, this causes bytes either to be read from or written to the LCD RAM. This line is contained within the subroutine "CC" from lines 200 to 320. "CC" is called four times (once for each bank) from within the loop "OL" bounded by lines 370 and 520, which is in turn executed 10 times (once for each of the 10 drivers).

Prior to calling 29943 decimal, we must set up the following entry conditions:

A-Register:

- Zero in order to write bytes to the LCD
- Non-zero in order to read bytes from the LCD. The proper value is retrieved each time from RW, the read/write flag. (Lines 240-250). The purpose of ORI instruction in Line 250 is to set the zero flag to correspond to the zero or non-zero contents of the A-Register, since the LDA instruction has no effect on flags.

B-Register:

0,64,128,192 to indicate bank 0,1,2 or 3 respectively. (In "OL" loop at lines 370, 390, 410 and 430).

DE Register Pair:

50 (decimal) to indicate the number of bytes to transfer. (Line 220).

HL Register Pair:

The address in memory from which, or to which, to begin the transfer. This is taken (in Line 230) from "MP" which is initialized in Line 100 and incremented in lines 280-310.

Furthermore, the appropriate driver must be enabled (lines 200-210). "TP," which is initialized in Line 330 and incremented in lines 450-480, points to a table in ROM which contains the appropriate bit patterns to enable each driver separately.

The process is terminated when "TC," which is initialized to 10 in Line 350 and decremented in lines 500-510, reaches zero (Line 530).

Immediately before the exit, the keyboard which had been disabled in Line 270 is re-enabled (Line 530) via a ROM call.

Notes on the Source Code

The Source Code is given in the infamous Intel mnemonics. The assembler I used was downloaded from the Model 100 SIG on CompuServe and further modified by me, so I can't guarantee that the exact syntax will work with your assembler. For example, the line numbers are not used by many assemblers and the use of "/" to indicate the beginning of comments is

```
62915 DATA 5Ø, 147, 245, 6, Ø
6292Ø DATA 2Ø5, 153, 245, 6, 64
62925 DATA 2Ø5, 153, 245, 6, 128
6293Ø DATA 2Ø5, 153, 245, 6, 192
62935 DATA 2Ø5, 153, 245, 42, 151
6294Ø DATA 245, 35, 35, 34, 151
62945 DATA 245, 58, 147, 245, 61
6295Ø DATA 5Ø, 147, 245, 194, 198
62955 DATA 245, 2Ø5, 6Ø, 116, 2Ø1
```

PCM BAR CODED LISTING

The listing: BARSTR.BA

```
Ø REM BARSTR 5/8/85
1Ø CLS
2Ø G=6Ø855
3Ø FOR I=ØTO1999
4Ø A = PEEK(G+I)
45 GOSUB 5ØØ
48 M=256
5Ø FOR J=7TO Ø STEP -1
6Ø M=M/2
65 C=M AND A
7Ø X=P+5Ø*D:Y=J+8*B
75 IF D>4 THEN Y=Y+32
8Ø IF C=Ø THEN PRESET (X,Y) ELSE PSET (X
,Y)
9Ø NEXT J
1ØØ NEXT I
11Ø A$=INPUT$(1)
499 STOP
5ØØ D=I\2ØØ
51Ø R=I-D*2ØØ
52Ø B=R\5Ø
53Ø P=R-B*5Ø
54Ø RETURN
```

PCM BAR CODED LISTING

The listing: LCSAVE.BA

```
Ø 'LCSAVE 5/7/85
9ØØ CLS:CLEAR 2ØØ,58855
91Ø LOADM"SMS.CO"
1ØØ1 PRINT@Ø,"";
1Ø05 GOSUB 12ØØ
1Ø1Ø CALL 62855,1,58855
1Ø2Ø A=73
1Ø21 CLS
1Ø3Ø GOSUB 2ØØØ
1Ø4Ø CALL 62855,1,6Ø855
11ØØ END
12ØØ FOR X=ØTO 239
12Ø5 X1=X/2Ø
122Ø Y=31*COS(X1)+32
1221 PSET (X,Y):X2=X
1222 FOR J=1TO5
1223 X2=X2+5:IF X2>239THENX2=X2-24Ø
1224 PSET (X2,Y):NEXT
123Ø NEXT:RETURN
2ØØØ A$="":FOR I=ØTO 38:A$=A$+CHR$(A):A=
A+1:NEXT
2ØØ4 FOR I= 1 TO 8:PRINT A$;:NEXT:PRINT"
1234567";
2Ø05 RETURN
```

PCM BAR CODED LISTING

The listing: LCSTR.BA

```
Ø 'LCRSTR 5/2/85
8Ø CALL 62855,Ø,58855
9Ø A$=INPUT$(1)
1ØØ CALL 62855,Ø,6Ø855
1Ø2 A$=INPUT$(1)
1Ø5 GOTO 8Ø
```

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probably not standard. However, the object code in Listing 5 can be relied upon.

For more information on ROM calls and a discussion of the LCD hardware, see *Hidden Powers of the TRS-80 Model 100* by Christopher L. Morgan.

The Next Step

The ability to save and restore arbitrary sections of the screen rather than the entire screen is probably the most obvious and desirable enhancement. It might make possible some types of animation within limited memory.

This problem could also be approached without modifying *SMS* by calculating where in the 2,000 byte area the sub-area is located. In the 2,000 byte area we've reserved for the screen image, the first line of the screen is distributed in a non-contiguous fashion thus:

Bytes	1- 50
	201-250
	401-450
	601-650
	801-840

Bytes 841-850 don't correspond to any pixels.

The second screen line goes like this:

Bytes	51-100
	251-300
	451-500
	651-700
	851-890

Again, bytes 891-900 don't correspond to pixels.

I think you can see the pattern. With this information, you can address any area of the screen. For example, you can create an image using PSET, save it using *SMS* then pick off the subsection of the screen in which you are interested from the 2,000 byte area. Later, when you wish to restore the small area, save the screen again, poke the small area(s) or use a machine language block move, and restore the screen. All three steps in machine language would probably be too fast to be observable.

If you have questions or comments, I would be pleased to hear from you at 1681 E. Dorothy Lane #14, Kettering, Ohio 45429. □

Listing 5: Assembly Language Source Code

```
1ØØ F587  22 95 F5     SHLD,MP/SMSSRC 4/3Ø ****
11Ø F58A  32 94 F5     STA,RW
12Ø F58D  CD 5C 76     CALL AD3Ø3ØØ/TURN OFF KBD/CURSOR
13Ø F59Ø  C3 BB F5     JMP CM
14Ø F593  ØØ         TC NOP /LOOP COUNTER
15Ø F594  ØØ         RW NOP /READ/WRITE FLAG
16Ø F595  ØØ         MP NOP /POINTS TO MEMORY AREA FOR
17Ø F596  ØØ            NOP /TRANSFER TO OR FROM
18Ø F597  ØØ         TP NOP /POINTS TO ENTRY IN TABLE
19Ø F598  ØØ            NOP /FOR DRIVER ENABLE
2ØØ F599  2A 97 F5 CC LHLD,TP /COMMON CALL
21Ø F59C  CD 3B 75     CALL AD3ØØ11 /ENABLE LCD DRIVER
22Ø F59F  11 32 ØØ     LXI D, ØØ5Ø
23Ø F5A2  2A 95 F5     LHLD,MP /POINTER TO MEMORY DEST
24Ø F5A5  3A 94 F5     LDA,RW/Load read/write flag
25Ø F5A8  F6 ØØ        ORI, ØØØ/set or reset Z flag
26Ø F5AA  CD F7 74     CALL AD29943/ Read or Write LCD Bytes
27Ø F5AD  CD 5C 76 PW  CALL AD3Ø3ØØ/TURN OFF KBD/CURSOR
28Ø F5BØ  2A 95 F5     LHLD,MP
29Ø F5B3  11 32 ØØ     LXI D, ØØ5Ø
3ØØ F5B6  19           DAD D
31Ø F5B7  22 95 F5     SHLD,MP
32Ø F5BA  C9           RET
33Ø F5BB  21 43 76 CM  LXI H,AD3Ø275/START OF ROM TBL FOR LCD DRIVERS
34Ø F5BE  22 97 F5     SHLD, TP
35Ø F5C1  3E ØA        MVI A,Ø1Ø
36Ø F5C3  32 93 F5     STA,TC/OUTER LOOP COUNTER =#LCD DRIVERS
37Ø F5C6  Ø6 ØØ      OL MVI B,ØØØ/ OUTER LOOP
38Ø F5C8  CD 99 F5     CALL CC
39Ø F5CB  Ø6 4Ø        MVI B,Ø64
4ØØ F5CD  CD 99 F5     CALL CC
41Ø F5DØ  Ø6 8Ø        MVI B,128
42Ø F5D2  CD 99 F5     CALL CC
43Ø F5D5  Ø6 CØ        MVI B,192
44Ø F5D7  CD 99 F5     CALL CC
45Ø F5DA  2A 97 F5     LHLD,TP
46Ø F5DD  23           INX H
47Ø F5DE  23           INX H
48Ø F5DF  22 97 F5     SHLD,TP
49Ø F5E2  3A 93 F5     LDA TC
5ØØ F5E5  3D           DCR A
51Ø F5E6  32 93 F5     STA TC
52Ø F5E9  C2 C6 F5     JNZ OL
53Ø F5EC  CD 3C 74     CALL AD29756
54Ø F5EF  C9           RET
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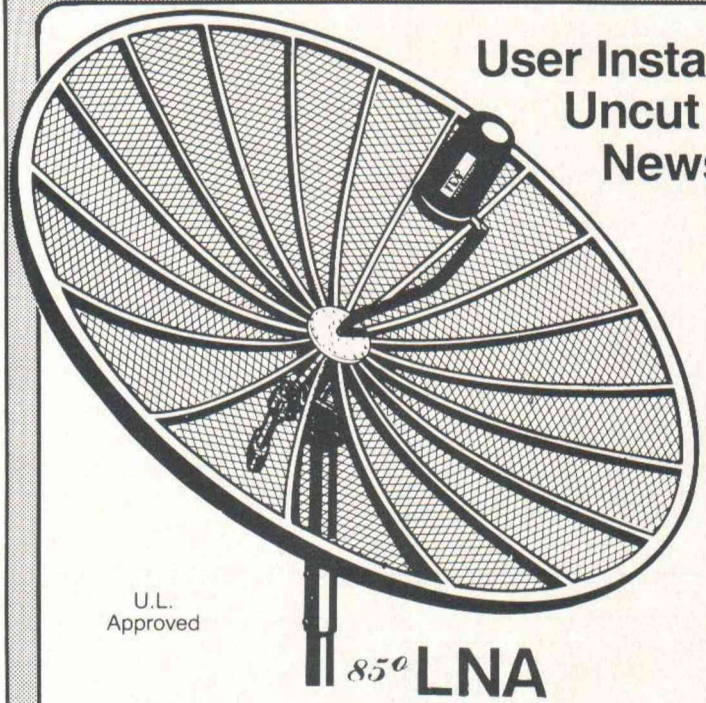

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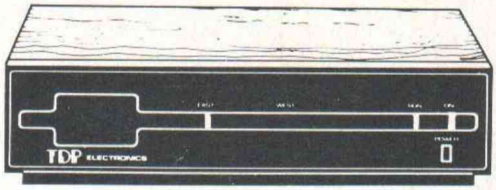

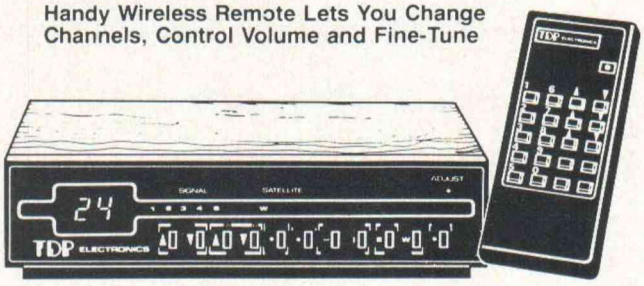

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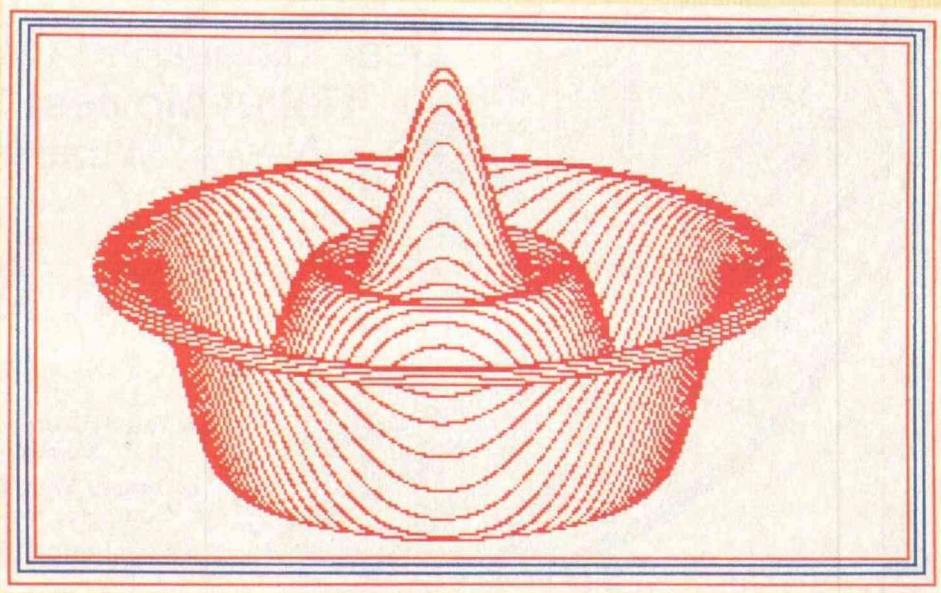

The Listing:

```
10 CLEAR 1000,,,32768!:DIM A(32)
20 KEY OFF
30 CLS:LOCATE 1,20:PRINT" Contour Graphics By Charles E. Moore"
40 LOCATE 2,20:PRINT STRING$(38,"_")
50 LOCATE 5,22:PRINT"Line Density (Max=8) (Default=8) ";:LD$=INPUT$(1)
60 LET LD=VAL(LD$):IF LD<1 OR LD>8 THEN LD=8
70 LOCATE 6,22:INPUT"Dot Density (Default=90) ";DOT
80 IF DOT<10 OR DOT>100 THEN DOT=90
90 LOCATE 8,22:PRINT" * Select Viewing Angle *"
100 LOCATE 9,22:PRINT"0 Degrees is from Overhead"
110 LOCATE 10,22:PRINT"90 Degrees is from Side"
120 LOCATE 11,22:INPUT"Angle in Degrees (Default=70)";A
130 IF A<1 OR A>100 THEN A=70
140 A=A*3.14159/180:S=SIN(A):C=COS(A)
150 CLS:SCREEN 6
160 WIDTH 40
170 PSET(1,1):DRAW"C4;"+"R318;"+"D198;"+"L318;"+"U198;"
180 PSET(10,9):DRAW"c4;"+"r300;"+"D181;"+"L300"+"U181;"
190 PSET(4,4):DRAW"c1;"+"r311;"+"d191;"+"l311;"+"u191;"
200 PSET(7,6):DRAW"c1;"+"r305;"+"d186;"+"l305;"+"u186;"
210 FOR I=-4*DOT TO 0
220 MAX=-100:MIN=100:X=I/DOT:X1=INT(30*X+.5)
```

```
230 NL=INT(SQR(16-X*X)*LD)
240 FOR K=-NL TO 0
250 Y=K/LD
260 GOSUB 340
270 A(-K)=Z
280 GOSUB 370
290 NEXT K
300 GOSUB 450
310 NEXT I
320 FOR DL=1 TO 3000:NEXT DL
330 GOTO 320
340 R=1.25*SQR(X*X+Y*Y)
350 Z=1.75*(COS(R)+.4*COS(3*R))+.25
360 RETURN
370 Y=INT(30*(C*Y+S*Z)+.5)
380 IF Y<MIN THEN MIN=Y ELSE 410
390 PSET(150+X1,96-Y),12
400 PSET(150-X1,96-Y),12
410 IF Y>MAX THEN MAX=Y ELSE 440
420 PSET(150+X1,96-Y),12
430 PSET(150-X1,96-Y),12
440 RETURN
450 FOR K=0 TO NL
460 Z=A(K)
470 Y=K/LD
480 GOSUB 370
490 NEXT K
500 RETURN
```

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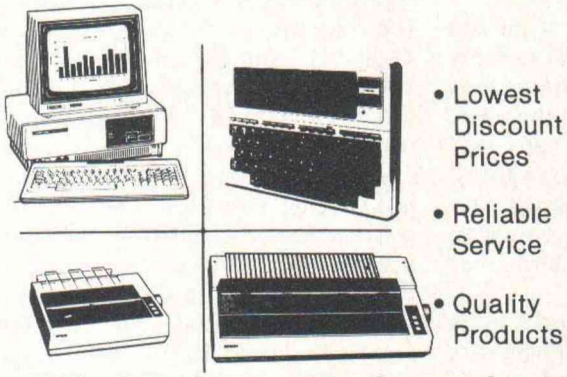

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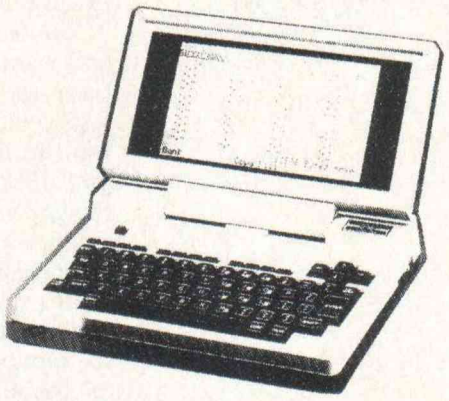

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The Power of Open Access

By Marty Petersen

Marty Petersen, formerly with Software Products International, gives us an insider's look at this powerful integrated program.

This is not a intended to be a sales pitch for *Open Access*. Neither is it meant to be a technically-oriented discourse on the complexities of the program. What it is . . . is just me, a person who has had a fair amount of experience using the program, talking informally to you, a person who perhaps is interested in knowing something about the program without being overwhelmed by tons of dialog.

Maybe you just bought *Open Access* and want some tips on how to get the most use out of it. Or maybe you're just curious about the program and want to find out what it can do. If so, pull up a chair and I'll tell you some things I've discovered.

Open Access is classified as an "integrated" program, which simply means that it is several programs that combine to operate as one. In this case, six modules join forces; the functions of database, spreadsheet, graphics, word processing, time management and communications ally in a common environment that shares data and other facilities.

Its primary program, or module, is the Information Manager. There are several nicknames that people use to describe this module . . . file manager, database manager and so forth. If you want to be accurate, it is a relational database manager. This means that it has the ability to work with more than one file, or database, simultaneously. This fact has powerful implications that most people do not realize.

For instance, let us assume that you belong to some organization that wants to keep track of families. You would like to create a database that contains the family name, address, city, state, ZIP code and phone number, and then the names and birthdays of each family member. Sounds easy enough, doesn't it? Well, when you get down to designing the fields for each element of information, how many fields should you set aside for family members? Should you allow for two children? Or five? Well, I have nine! If you allow for a large number, just to be safe, then that is wasteful use of valuable storage space (because not too many people have nine children). And if you chop it off at a small number, say three, then six of my children would be dispatched to oblivion.

A better way to handle the problem is to create two files. The first would contain the common family information, such as the family name, address, and etc. The second file would contain the names and birthdates of each family member. There is no wasted space, because if a family contained only two persons, then only two records would be created. In my case, the computer would create 11 records.

But most important of all, each file would contain one piece of information that is common to both. This is the

"link" that "relates" one file to another. In this example, you might be tempted to include the family name in the second file which would relate to the family name in the first file, but there may be more than one family with the same name, and the computer wouldn't know what to do. (Imagine what would happen if it came across "Smith" or "Jones.")

A link that relates files should be something unique. A phone number is unique, isn't it? If you include the phone number in each record of the second (members) file, then the family name in the first file would link or relate to the members' names in the second file by a common phone number.

They say that a picture is worth a thousand words, so here are some diagrams that hopefully illustrate what I just explained. "Single File" shows how the family information would have to be stored when the computer can work with only one file at a time. "Relational Database" shows how two files are linked together on a common field.

I, personally, use a different approach. *Open Accsss* can link on a single field, but it can also link on two or more fields if they are tied together in the joining statement. What I have, in the family file, is a "family last name" field and a (head of) "family first name" field. In the members file there is a "members last name," a "members first name," a "family last name" and a "family first name" field.

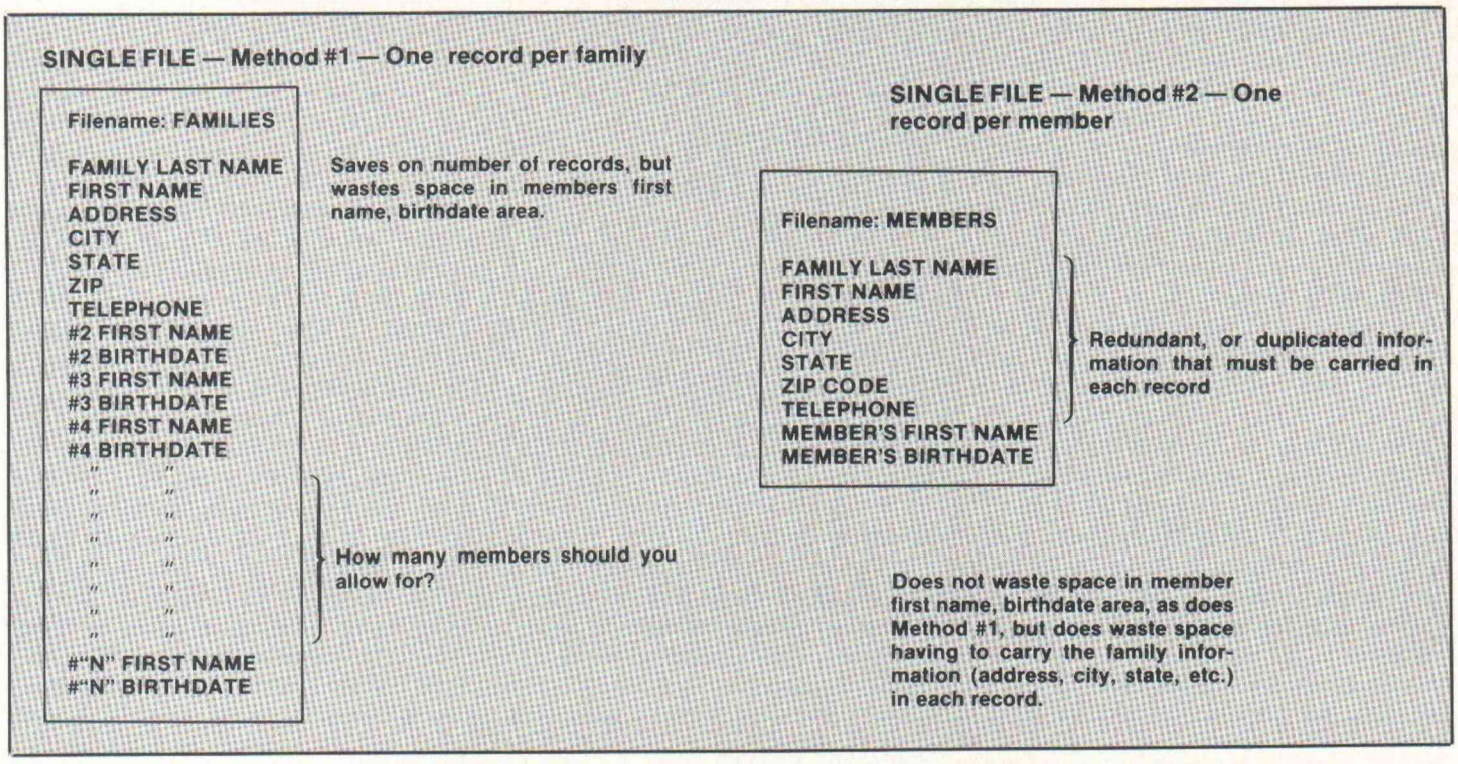
I tie the "family last name" to the "family first name" in the members file and link them to the "family last name" plus "family first name" combination in the family file. This approach has several advantages. First, it addresses the reality of the fact that family members do not necessarily have the same family name. Divorces and adoptions are all part of life. Second, it allows me to create some fancy printouts in reports. There are times, for instance, when I want to print "Jack Jones" rather than "Jones, Jack," or in a mail-merge operation I may want to use the phrase "Dear Jack" or "Dear Mr. Jones" rather than "Dear Jones, Jack." By dividing the person's name into two separate fields, you have more flexibility of control of how you want to print it out in a report. When you set up a database, particulary with names, you need to anticipate how you are going to report the information you are storing.

> "Open Access does windows! Very nicely, I might add."

Well, I promised you that I wouldn't get too deeply technical, so let me talk about some other things you might like to know about the program. I know you've heard the phrase "we don't do windows!". But *Open Access does* windows! Very nicely, I might add. Just what is a "window" in computer language? Imagine a computer screen filled with information from top to bottom, like your desk loaded with paperwork. Let's suppose that you want to make a quick calculation for a project you're working on, so you take out your "four-banger," lay it on top of your papers, perform the calculation, and then put the calculator away. If you drew a box around your calculator, that would be similar to a "window" on the computer.

With *Open Access*, if you wanted to do a quick calculation, you would press the CALC function key. This would cause a calculator to appear on the screen, framed in a "window." Using the regular keys on the keyboard, you would operate this calculator just like you would a real one. After you are finished, you press the ESCape key which causes the calculator to disappear. Much in the same fashion as you work by stacking papers on top of papers on your desk, you can stack "windows" in *Open Access* by pressing function keys, use what's inside the window, and then clear them by pressing "ESCape."

As an example, a press of the HELP function key produces a "help" message



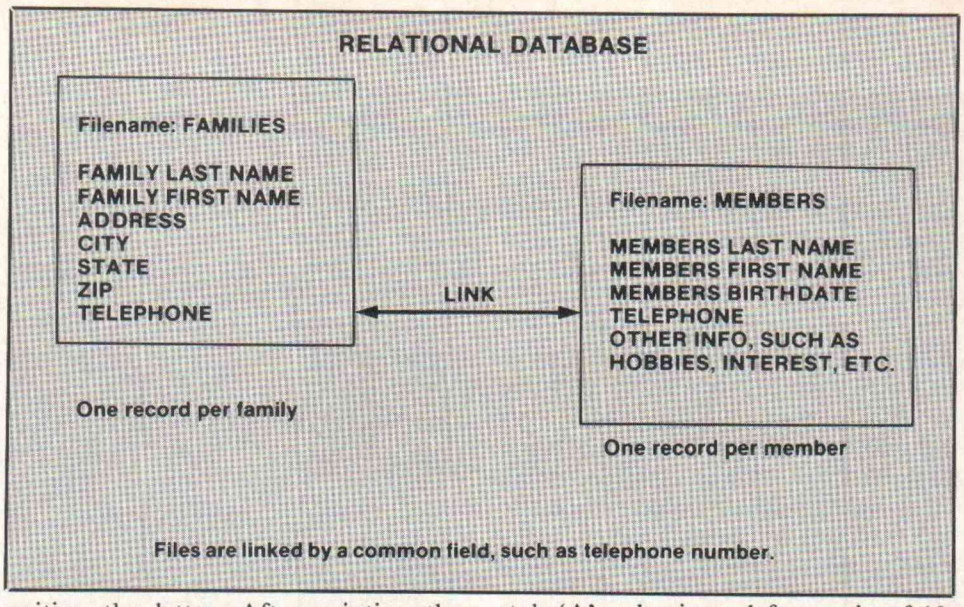
which is boxed in a window. The help message is relative to the specific location you are in the program. For instance, if you are in the database module, you won't get any information about how to use the word processor. By using the arrow keys, you can scroll the help information up or down inside the window. The help information occupies a lion's share of the program's RAM memory requirements and, nine times out of 10, you can get the help you need without having to refer to the manual. A second press of the HELP key produces another window which defines every function key or other special key used by the program.

There is also a window that lets you know the names of the files you have on disk (that's what the SEARCH key is for), and there are windows that call for menu choices (the MENU key, of course). Each time you press an appropriate function key a window appears, stacked and offset in much the same way as you would randomly stack papers on a desk, and each time you press ESCape a window disappears until you are back to your original screen.

Time for another regrouping. I find myself getting so excited when I talk about my favorite subjects that I forget that you might have something to say. Did you say you wanted to know something about the word processor? OK, let me tell you about that.

As a software reviewer, I have used a lot of different word processors. A lot. It got to the point where I swore I would never learn how to use another word processor because I didn't want to crowd my mind with the additional commands. But, when *Open Access* came along, I was pleasantly surprised. It makes use of the best of word processing philosophies . . . global settings when you need them, and in-text, override commands when you need them. It lets you decide which method of text-entry is the more comfortable to use.

Most people who use the word processor make the mistake of not utilizing the fantastic features of the program. A typical scenario goes something like this: John wants to type a letter to Mary, so he enters the word processor, selects "create new document" as opposed to "read old document," and then writes the letter. However, there are margins, justifications and print parameters (headers, footers, page numbers, etc.) to set up, so he probably spends more time setting up the document's parameters than actually writing the letter. After printing the letter, he may save it as a document file, or he may not.



Here is a better way to use the word processor which saves a lot of time in the long run. Make forms. That is, before you write a letter, or anything else, use the "create new document" option and create a form, called a "template." For instance, you could create a template called "T_LETTER" (the 'T' stands for template to remind you not to destroy this file). As soon as you establish the file, select "Background" and a background setup screen will appear. What this allows you to do is preset eight different paragraph formats, labeled 'A' through 'H'. For instance, you may define paragraph style 'A' as having a left margin of 10, a paragraph margin of 15 (the paragraph margin is the setting that the first line of the paragraph will tab to), a right margin of 70, and be left-justified (that is, the left margin will line up and the right margin will be ragged, just as a conventional typewriter would type).

"Most people who use the word processor make the mistake of not utilizing the fantastic features of the program."

You may want to set paragraph 'B' to have both left and paragraph margins of 20, a right margin of 60, and be both-justified (where both left and right margins line up). Can you visualize that this paragraph will be inset by 10 characters on each side relative to paragraph 'A' and have that "typeset" or printed look? If you use your imagination, I'm sure you can think of all kinds of styles that you would like to define paragraph settings for. I like to use "*out*dented" (as opposed to "*in*dented") paragraphs. This is where the first line of each paragraph starts to the left of the rest of the lines in the paragraph. It's great for highlighting information you might like people to notice, such as in a sales brochure or resume. In additon to setting paragraph styles, you can define codes that take the drudgery out of typing long phrases. For instance, to type this article I have defined "*OA*" as standing for "*Open Access*" I just type "*OA*." Just think of what a lawyer could do by perhaps, defining '1' to mean "the party of the first part"!

At any rate, after you have defined all of your paragraphs, and then have set the printer parameters to your liking, save the file as "T_LETTER." Now, whenever you want to write a letter, don't "create new document," but "read old document" named "T_LETTER." When it pulls into the computer, you will start out with a blank screen,

but all of your favorite margin settings, typing codes and printer parameters are preset for you. Before you type a paragraph, choose by letter 'A' through 'H' the paragraph style you want to use.

Don't worry about choosing the wrong style, because if later you decide you want to change it, you can without having to retype your text. After you have printed your document and you decide you want to save it as a textfile, don't save it as "T_LETTER" because that will destroy the template. Save the file under a new name, such as "MS022685" (Mary Smith — 02/26/85). When you do a search of files on your disk, you will then see a file called "MS022685," and you will notice that "T_LETTER" is still there for the next time you want to use it. Bear in mind that you can create hundreds of templates, each with paragraphs, code words and printer parameters set to your liking for the particular document you have designed the template for.

One of the criticisms of the word processor (an unjust one, I might add) is the fact that you can't create large single textfiles. You can create a textfile that will print out to a dozen or so pages, but you can't put the contents of a book into one file. Many authors claim that they can't print out their manuscript in one shot. Well, the fact of the matter is, *Open Access* can print out an entire book with a single swipe of the PRINT button, by using a simpler procedure than most other word processors.

You see, it's a matter of analyzing work habits. The general scenario of printing a book goes something like this: First, the author writes the "pieces" of the book and saves them as small files. Maybe there's a "Chapter 1" and a "Chapter 2" and so on. When he or she gets ready to produce the whole book, the thinking is to create a file called "book" and then copy "Chapter 1" and "Chapter 2" into "book." This is erroneous thinking. First of all, it is laborious and time consuming to copy small files into one large file, even if the word processor could handle it. Second, it is wasteful of disk storage space, and may not even be able to be accomplished. If "Chapter 1," "Chapter 2" and etc., take up more than half of the disk space, how is "book" going to be saved?

Open Access has a better idea, which is to use a "batch" processing technique, where you create a file that lists all of the files you want to print. What you do is simply create a textfile called "book." There is an embedded print command available in the word processor called "include." It is meant for a lot of things, like including database files, spreadsheet models and graphs with your text. Anytime you want to include something that is on file someplace else, just enter "^include <filename>." Well, this "include" command can obviously be used to include other textfiles, and the "include commands" can even be nested; that is, the file you "include" can have its own "include" commands.

Getting back to the scenario, once you have "book" established, just say "^include chapter 1," "^include chapter2," and so on. There is no limit; and when you print "book," you will print each of the subfiles in the order you specify. It's fast, easy, doesn't waste disk space, and doesn't waste your time copying files.

There are enough things about *Open Access* to tell you that it would take a book. Come to think of it, that's probably why *Open Access*'s documentation is so hefty. PCM

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Use the ANSI.SYS device driver to configure your video display

Exploring ANSI.SYS

By Danny Humphress

After a rather short introduction to MS-DOS system configuration last month, we are ready to move on to putting the CONFIG.SYS file to use. This month, we'll explore ANSI.SYS, the ANSI standard console driver.

ANSI.SYS

Probably the most common MS-DOS device driver is ANSI.SYS. ANSI.SYS causes your computer's console (the keyboard and display) to understand the codes used by terminals that follow the ANSI standard. Specifically, these are standard escape sequence codes used to reassign keys, change the display attributes and control cursor movement. Many programs use these ANSI codes because they are constant from one terminal or computer to another, regardless of the keyboard or video display used.

The fact that many commercial programs require the ANSI.SYS driver is reason enough for having it installed in your configuration file (CONFIG.SYS). However, ANSI.SYS offers many features the non-programming power user can take advantage of outside of these commercial software packages. By redefining keys and changing the video attributes, you can configure your MS-DOS system to work as your very own creation. It's these functions of ANSI.SYS that we'll discuss today.

ANSI Codes

Each ANSI function code is a series of characters beginning with an "ESCape" character (ASCII 27). These characters are simply sent to (printed on) the display. Instead of the characters being displayed on the screen, they are "caught" by ANSI.SYS and the specific operation is performed.

The ANSI function for clearing the screen, for example, is ESC [2J. To clear the screen using the ANSI codes, you would send an ESC character followed by the three characters, [2J.

If you're a BASIC programmer, your first response might be to do something like PRINT CHR$(27);"[2J" in BASIC. You would be on the right track, but, unfortunately, you can't use the ANSI codes directly from BASIC. This is because BASIC bypasses the BIOS (the internal program that controls input/output) and has its own way of handling the video display.

You might try pressing ESC on the keyboard and typing [2J. Close, but MS-DOS does not display the ASCII code for ESC when you press the key; instead it cancels the command line you're writing. Sorry.

So, the problem is that it's hard to get an ASCII 27 to display on the screen. Well, it's not *that* hard. An easy way to do it is to store an ESC character and the other characters in a file, then whenever you want the ESC sequence to go to the screen, you could use the MS-DOS TYPE command. The following BASIC program will create a file called CLEAR with the ESC sequence to clear the screen. You only need to run it once.

```
10 OPEN "CLEAR" FOR OUTPUT AS #1
20 PRINT #1,CHR$(27);"[2J"
30 CLOSE
```

Now, back in MS-DOS, you could type this command to clear the screen:

```
TYPE CLEAR
```

Of course, you could also just use the MS-DOS CLS command, but this is a simple example of one of the ANSI commands.

By chaining the filename in Line 10 and changing Line 20 for the particular ANSI code you want, this BASIC program can be used to generate files containing any ANSI codes you desire. Remember, though, that you must go back to the MS-DOS level and use the TYPE command to send the file to the display.

> "The fact that many commercial programs require the ANSI.SYS driver is reason enough for having it installed in your configuration file . . ."

Screen Colors

Let's try something a little more exciting. Change the previous BASIC program to read:

```
10 OPEN "MYSTERY" FOR OUTPUT AS #1
20 PRINT #1,CHR$(27);"[=3h";
30 PRINT #1,CHR$(27);"[34m";
40 CLOSE
```

Now run it, return to MS-DOS and enter TYPE MYSTERY.

If all went well and you have a color monitor, the DOS prompt will be blue and everything you type from now on (or until it's changed back) will be blue. If you have a monochrome monitor on a Tandy 1200 or 2000, the text on the screen will be underlined or not there at all, depending upon the graphics card used.

Line 20 of the program added the code to change the screen to the 80-by-25 color text mode (ESC [=3h). The next line changed the foreground color to blue (ESC [34m).

Please don't try to make heads or tails out of what these codes mean. There is no particular reason that ESC [34m changes the screen blue other than that's just the way ANSI

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wants it. A full list of ANSI codes can be found in the *Programmer's Reference Manual* among other places. For your information, though, Table 1 lists some common codes for changing the display.

One of the things I like to do with these little screen beautifiers is have a line in my AUTOEXEC.BAT file that will automatically change the screen color to green. Something such as TYPE GREEN would work if GREEN contained the proper ANSI codes. The only problem with this is some programs change the screen attributes back to the boring white on black and you have to enter another TYPE GREEN to get your color preferences back.

Redefine Keys

As mentioned, there are ANSI commands that allow you to change the meaning of the keyboard keys. To do this you have to know two things: the ASCII code or codes generated by the key on the keyboard, and the ASCII code or codes for what you want the computer to do when you strike the key.

The ASCII code for an uppercase 'A' is 65. The ASCII code for an uppercase 'B' is 66. To tell MS-DOS to redefine the 'A' key so you get a 'B' when it's pressed, you would use the following ANSI command:

```
ESC [65;66p
```

If you are using the above BASIC program to generate this code, Line 20 will look like this:

```
20 PRINT #1,CHR$(27);"[65;66p";
```

The 65 defines the key we are changing and the 66 tells MSDOS what we're chaining it to.

It's unlikely that you would want to change the alphabet around like this, unless you're making a Dvorak keyboard, so here's a more practical example:

```
ESC [4;"DIR";13p
```

This ANSI command changes the CONTROL-D key sequence to DIR followed by an ENTER (ASCII 13). Whenever you press CONTROL-D, the computer thinks you typed DIR and pressed ENTER.

There are a couple of things different about this command line. Instead of giving the ASCII values for DIR, we simply enclosed the string in quotes and let the ANSI.SYS driver figure the three ASCII values. The other difference is that we are replacing one keyboard key with four characters, DIR and the ASCII 13. You can use as many characters as you like this way.

Some of the special keys on the keyboard, namely the function keys, return two ASCII values instead of just one. The first character of these two-character keys is always an ASCII zero. The next character is a value in the range zero to 255. The F10 function key, as an example, returns zero and 68. This information can be found in the *Programmer's Reference Manual.*

To program the F10 key to DIR and ENTER, you would send the following ANSI command to the display:

```
ESC [0;68;"DIR";13p
```

Since the first value is a zero, ANSI.SYS knows this is a two-character key and that the second number is the second character returned by the key. The remaining characters, up to the p, are the new characters for the key.

More ANSI!

We've covered but a few of the available ANSI commands. Hopefully, these are enough to get you to the point where you can look at the charts in the *Programmer's Reference Manual* and know what to do.

In the August "MS-DOSsier," we'll use ANSI codes along with a new command, PROMPT, to change the MS-DOS environment to suit our needs, desires and moods. Sound interesting? □

Table 1 Common ANSI Codes

```
ESC [2J Erase the screen
ESC [K Erase the current line
ESC [0m Return to normal attributes
ESC [1m Bold characters
ESC [4m Underlined characters
        (monochrome mode only)
ESC [5m Blinking characters
ESC [7m Reverse video
ESC [8m Concealed characters
ESC [30m Black foreground
ESC [31m Red foreground
ESC [32m Green foreground
ESC [33m Yellow foreground
ESC [34m Blue foreground
ESC [35m Magenta foreground
ESC [36m Cyan foreground
ESC [37m White foreground
ESC [40m Black background
ESC [41m Red background
ESC [42m Green background
ESC [43m Yellow background
ESC [44m Blue background
ESC [45m Magenta background
ESC [46m Cyan background
ESC [47m White background
ESC [=0h 40 x 25 monochrome mode
ESC [=1h 40 x 25 color mode
ESC [=2h 80 x 25 monochrome mode
ESC [=3h 80 x 25 color mode
```

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Be prepared for April 15 with these spreadsheet templates

Preparing for the Tax Collector

By Richard A. White
PCM Contributing Editor

The basic simplicity of spreadsheeting is brought home in a new book, *1-2-3 from A to Z*, Elna Tymes and Tony Dowden, Hayden Books, 1985. This book includes 59 complete templates for *Lotus 1-2-3*. Many of these are simple examples consisting of making lists and finding subtotals and final totals. The next order of complexity deals with interest calculations which are not much more than multiplication. @IF( ) is used a lot in some sheets, @SUM( ) shows up frequently, @AVG( ) less so and @NPV( ) very infrequently. Divisions show up frequently since one is often looking for usage per time period averaged over some period or average cost per item when total manufacturing costs are known. Still, none of this is particularly complicated.

A basic problem I have is finding spreadsheet tasks that even start to challenge the capabilities of spreadsheet programs. A finite element analysis of the stresses and deflections in a flat plate secured at two sides and loaded in the center might do. But, I just don't have need for that information today and I doubt that many of you do, either. Repetition of simple structures characterizes most spreadsheets.

We have talked in previous columns about REPLICATE and COPY commands. These work wonders in building the basic spreadsheet. Now think about repeating your basic template a number of times in a single spreadsheet. It's not hard, but it does raise some point to think about that we have not touched before. We need an example which I just recently had in a bag over on my book shelves.

How many of you save your sales slips so you can total your sales tax for the year to deduct from your income tax? That's what I keep in the bag —a bunch of sales slips. Sometimes all that tax needs to be added up, so let's do it in a semi-organized way. We could take each sales slip off the pile, write down the tax and put it on another pile; then add up all the numbers. Or we could build a budgeting spreadsheet, where each purchase is categorized and entered in its category. The program then might calculate monthly subtotals by category, compare these to the budgeted amounts and show whether we are over or under budget. Plus, this data helps in establishing future budgets.

I have real problems with this. My computer budget would have to be negotiated with my wife, who is not particularly pro-computer. On the other hand, I am anti-garden-mulch, which causes her problems. She does not tell me how many bags of mulch she buys and I say very little about the new disk drives.

An intermediate approach is to organize the data just enough in a spreadsheet to impress the IRS, if needed, and say that's enough. I decided to group the data by month with subtotals and then get a year-end total. Being able to check the entries by the date would be required, as well as a brief purchase description. Curiosity got the better of me, so I included a total sale column.

The strategy will be to build a template for one month, and then duplicate this monthly template a number of times to get part of a year into a single spreadsheet.

Why only part of a year? There are limits to the number of rows a spreadsheet will permit. Users of *Lotus* or some other large spreadsheet don't need to worry about this,

---

(Richard White has a long background with microcomputers and specializes in BASIC programming. With Don Dollberg, he is the author of the TIMS *database management program for the Color Computer.)*

as publishers seem to be competing to put out the largest spreadsheet program possible. This is fine if you have 640K and dream about two megabytes. Those working with *Lucid* or *MultiPlan* in a Tandy 100 or 200 know that every little byte counts, so they live with limits. *Lucid* supports 255 rows while *MultiPlan* supports only 99. Some of these rows will be tied up with monthly headings and totals. If you are going to save money by itemizing your sales taxes, you will probably have over 200 purchases requiring more rows than are available in a limited spreadsheet. Memory may be a limit, rather than row count, in larger spreadsheets. If you are using a larger sheet, try putting the whole year in. It won't hurt to take the chance. If you do run out of memory in the middle of November, whip up a new template to finish out the year.

Figure 1: One-Month Template

```
   [   A   ][        B          ][   C   ][   D   ]
 1-  MONTH-
 2-DAY              PURCHASE            TAX      TOTAL
 3-
 4-
 5-
 6-
 7-
 8-
 9-
10-
11-
12-
13-
14-              MONTHLY TOTAL          0         0
15-
```


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Now, the joker in the back of the room who was selling 4K memory chips as antiques asks, "why not put two six-month templates side by side?" This might work, but not be as neat when we insert rows in months that have a large number of purchases while the adjacent month does not need these extra rows.

The top portion of our template is shown in Figure 1. To simplify setup, I made the monthly template 15 lines long. This way, a month will start at either X1 or X6-16 or 31, for example. Once you start using the template, this order will be lost when you insert lines, but by that time it will have served its purpose.

The first order of business is to plan the column widths. The only column needing to be wider than the default nine characters is B for purchase description. I set this at 16. If you are working on a Tandy 100 or 200 you had best leave column B at nine characters so all four columns show on the display. Column A for the date, C for the Tax and D for the total sale can stay at nine characters.

Next comes formatting. In column A, dates are to be neatly shown left justified under the heading. In a similar fashion, a '$' format is to be put on columns C and D.

In some spreadsheets, one FORMATs individual cells and then REPLICATE or COPY those cells down a column. Some spreadsheets won't FORMAT an empty cell, so put a space into the cell and then FORMAT it. *Lotus 1-2-3* has a centering format which you can use rather than the left justification for column A. Once you have formats in cells A3, C3 and D3, use your REPLICATE or COPY function. Your starting range is A3 . . . D3 and then the target range which is A4 . . . A15.

Labels can be typed in any time. Formats apply here and can be handled in a number of ways. Some spreadsheets accept leading spaces and you can manually add the number needed to place the label just so. Too many? Edit the line to take one or more out. Others won't accept leading spaces, but you may have the centering option available or right justify the text with trailing spaces to move the label off the right cell boundary a space or two. In Figure 1, MONTH- and PURCHASE were added with leading spaces. TAX and TOTAL in row 2 were right justified as was MONTHLY TOTAL in B14.

Finally, we enter the summation formula in cell C14 and COPY or REPLICATE it to cell D14. Its *Lotus 1-2-3* form is @SUM(C3 . . . C13).

The intention is for the user to type in the month and even year into cell B2 or its copies after the MONTH- that is in A2. You might also want to put the month in A14 so that row might read:

```
   [   A   ][        B          ][   C   ][   D   ]

14-JAN '85       MONTHLY TOTAL        X.XX    YY.YY
```

Some spreadsheets let you use a formula to duplicate what you type into B2, say, A14. One form is @IF(@TRUE,B2). This works on both numbers and labels and copies whatever is in B2. Note that a formula +B2 in A14 will copy numbers but not text.

That completes our template for one month of entries. You will need more than eleven lines most months. Put the cursor on row 14 or its equivalent in copies and INSERT however many additional rows you need. You also may need to COPY or REPLICATE a blank and formatted row of cells into the column A range for the new rows

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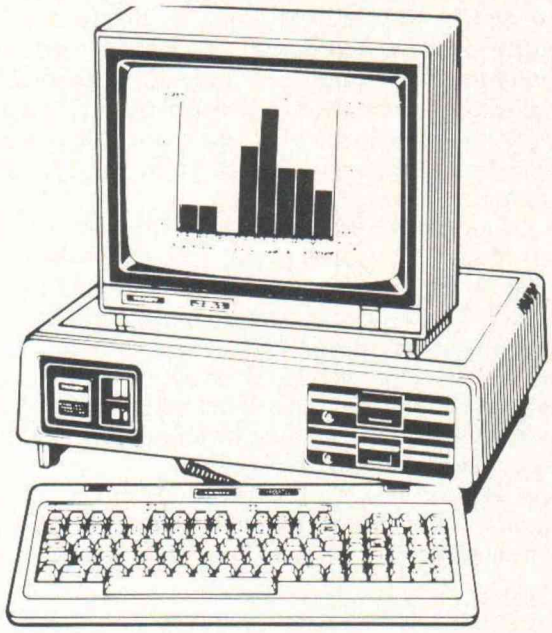

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inserted. Say you inserted six new rows. Cells A14 . . . D14 become A20 . . . D20. The cells in the range C14 . . . D19 now are not formatted. COPY A20 . . . D20 to the target range A14 . . . A19 to do the formatting.

Now is the time to put some data into the template to make sure it works right. The first law of computing is *There Are Always Bugs*. It applies to spreadsheets as well as any other types of programming. It is most important to get this one right to avoid having the same errors show up in each copy.

Now that things are right and you have cleared your test data out, it's time to copy the one-month template a number of times to make the overall template. But, first we must observe the second law of computing. *Save Early and Often*. For some spreadsheet users this is a safety play. Others will need this file to build their complete templates.

The *Lotus 1-2-3* COPY command makes generating the full template a piece of cake. COPY A1 . . . D14 to A16. Now we have two months' worth of templates ending at row 29. Leaving row 30 blank like row 15, COPY A1 . . . D29 to A31. Now there are four. COPY A1 . . . D29 to A61 to complete a sheet for six months of data. One last task is to provide totals for this sheet and year-to-date totals.

```
   [   A   ][        B          ][   C   ][   D   ]
89-JUN '85        MONTHLY TOTAL     XX.XX  YYY.YY
90-TOTALS THIS SHEET               XXX.XX YYYY.YY
91-TOTALS PREVIOUS SHEET
92-YEAR TO DATE TOTALS             XXX.XX YYYY.YY
```

Cell C90 contains the formula +C14+C29+C44+C59+C74+C89. This adds up all the monthly totals. Note the pattern X4+X9+X4+X9 . . . which results from our keeping 15 row increments for each month. Patterns like this make it easy to set up formulae from memory without having to go back through the spreadsheet to write down cell addresses. Patterns also help avoid errors since mistakes tend to stand out as something different.

Cell C92 contains =C90+C91. Now COPY the range C90 . . . C92 to D90 and it's time to file it to disk.

VisaCalc and some derivative spreadsheet programs lack a COPY command, but copies can be made using disk or tape files. Generally, these programs do not erase the existing spreadsheet when a new one is loaded. The procedure calls for inserting blank rows to move the existing sheet contents down enough to make room for the one to be loaded. Our one-month template uses 15 rows including the blank row 15. INSERTing 15 rows above current row 1 will make room.

Figure 2: Example of One Month of Data in The Template

```
   [   A   ][        B          ][   C   ][   D   ]
103-  MONTH- MAY '85
104-DAY            PURCHASE            TAX     TOTAL
105- 1        TV TAPE                 1.80     37.62
106- 3        MEYER'S                 0.24      4.93
107- 4        MARSH                   0.46     51.01
108- 4        HARDWARE                0.45      9.31
109- 5        MEIJER                  2.71     56.81
110- 10       CAR RENTAL              8.94    187.69
111- 11       MARSH                   0.73     57.20
112- 13       LAWN MOWER REPAIR       1.48     28.38
113- 18       MEIJER                  0.27      5.50
114- 18       MARSH                   2.11    114.51
115- 20       MEIJER                  0.42      8.75
116- 20       MEIJER                  0.04      0.84
117- 25       MCALPINS                1.65     31.62
118- 25       MARSH                   1.20     97.87
119- 26       MEIJER                  0.25      6.99
120-
121-MAY '85       MONTHLY TOTAL      22.75    699.03
```

Now, load the single month template. You did save it, didn't you? It will overlay the new blank rows that you added making a two-month template. Check it out, and if all is well, save it to disk or tape. Now make two passes where 30 rows are inserted each time and then the two-month template is loaded. Your final task is to add the sheet and year-to-date totals and save the complete template. Figure 2 is an example of the sheet in use. Note that our nice 15 rows-per-month pattern has been destroyed as more rows were added in prior months.

The concept of building a basic template and then repeating it over and over has wide application both at home and in business. Data may be grouped in a variety of different ways depending on reporting needs. Weekly and monthly summaries are common. In business, monthly summaries are combined to produce quarterly reports and these are compiled into year-end reports. The implication is that data must be transfered from one spreadsheet to another.

VisaCalc pioneered data transfer through disk files, and most creditable spreadsheet programs provide this capability. Our year-to-date totals are candidates for such transfers. It's true that for two numbers, writing them down and typing them into C91 and D91 of the new template, when it is started, would be easier. However, examples should be simple and easy to understand at the beginning; certainly transfer of two numbers qualifies on both counts. I will explain the *Lotus 1-2-3* steps.

Say, for instance, it's the end of December and that our summary at the end of the second spreadsheet for the year looks like this:

```
   [   A   ][        B          ][   C   ][   D   ]
89-DEC '85        MONTHLY TOTAL     35.82  952.82
90-TOTALS THIS SHEET               154.87 3872.44
91-TOTALS PREVIOUS SHEET
92-YEAR TO DATE TOTALS             154.87 3872.44
```

We need to bring the totals from the previous sheet over. Load that sheet and move to the TOTALS THIS SHEET row. Key into *Lotus*, " /, F, E." You will need to specify the range, C90 . . . D90, as well as a filename, to save.

To load data, the cursor must be positioned on the cell where the loading is to start before the keystroke sequence, " /, F, C." After you specify the filename, the data is loaded from disk.

This is a somewhat simplified sequence, as different spreadsheets have different features and need additional information to complete a data transfer.

```
   [   A   ][        B          ][   C   ][   D   ]
89-DEC '85        MONTHLY TOTAL     35.82  952.82
90-TOTALS THIS SHEET               154.87 3872.44
91-TOTALS PREVIOUS SHEET           182.65 5034.88
92-YEAR TO DATE TOTALS             337.52 8907.32
```

This method becomes quite useful in larger business spreadsheets where the same data is used in two or more spreadsheets, or where data in last month's spreadsheets must be moved to new locations to be ready to enter this month's activities. We will deal with this in the future. If you want to try this earlier, I would suggest you get the book referenced earlier, one for your particular spreadsheet or another on either *Lotus 1-2-3* or *VisiCalc* that provides examples. PCM

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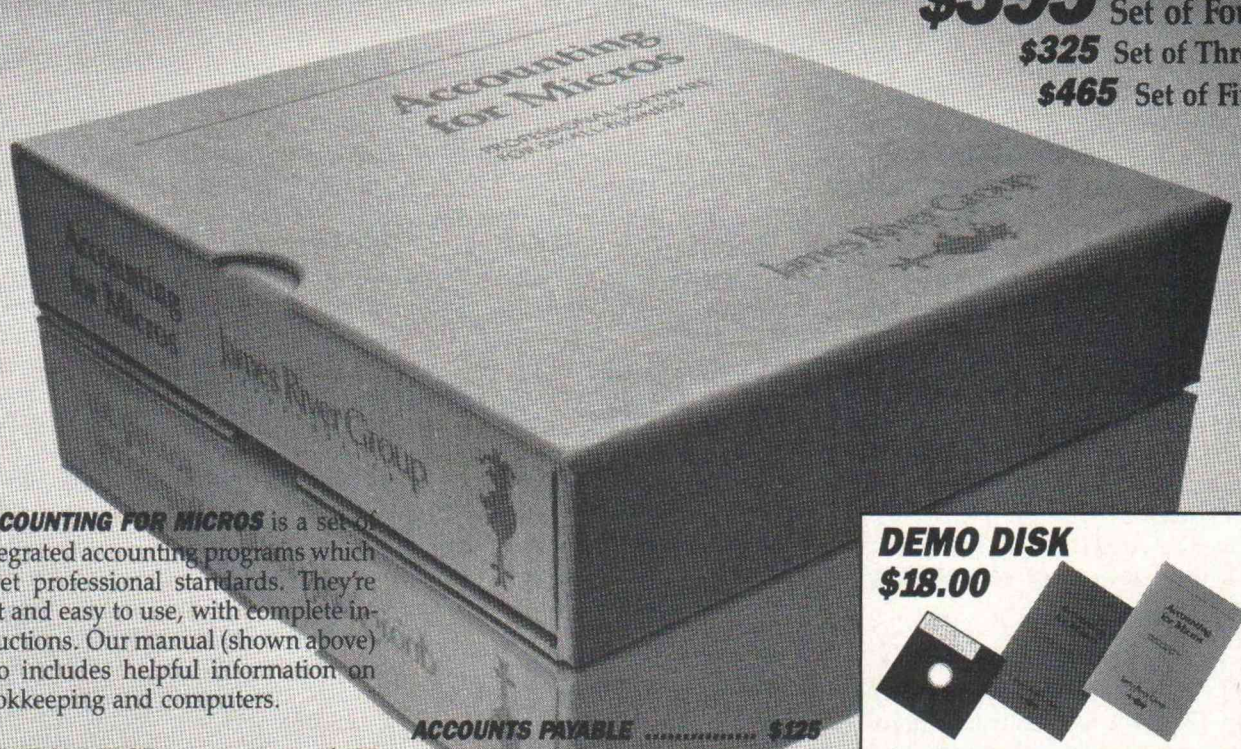

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Omniterm 2 Communications Software Called 'The Greatest'

Omniterm 2 has all the telecommunications features I could ever want, and a few more I didn't even realize were possible: a scroll back option for those times I've been on a new BBS (Bulletin Board System) and couldn't remember their command list, a color program (for those of us who are RGB snobs), XMODEM protocol (to download non-ASCII files), a simple-to-use menu driven program (so I wouldn't have to refer back to the manual) and a way to get back into DOS without breaking the connection with the host computer (to check the exact name of the file I plan to upload).

I was impressed with the on-screen clock and stopwatch feature (to tell me how long I've been connected to a $6 per hour service), easy setting of RS-232 parameters for several types of telecommunication, re-dial feature for those times when my favorite system is busy, programmed keys for passwords and user names, and a way to dial remote hosts using my alternate long distance service codes.

This non-copy protected program works well on a floppy system, such as the Tandy 1000 or 2000, and on a hard disk system like the Tandy 1200. Version 6.04 for the 2000 runs in monochrome on the color monitor and requires 256K RAM, but 5.04 for the 1000 and 1200 operates in color and needs only one drive and 128K.

Included with the program are sample file settings for The Source, Dow Jones News Service, CompuServe, Delphi, and Newsnet. There are also instructions for direct connection to a XENIX or UNIX multi-user computer system at 9,600 Baud. The manual has a chapter on "Getting Started" and ten minutes after unwrapping the software I was online with CompuServe.

When *Omniterm 2* is activated from DOS, a screen with the logo appears, called "Smart Terminal Mode." Using the F1 function key gets into the options menu. I tested the software using a Rixon 212A, and a Hayes 1200 modem which required a simple DIP switch change. With the Hayes, I dialed directly from the options screen, but with the 212A in "Rixon mode," I needed two carriage returns to activate the modem from the smart terminal mode.

The five terminal emulation choices are TTY or "dumb terminal," a DEC VT100, DEC VT52, customized for special terminal characters or an automatic answer host. The echo/line feed mode can be set for full or half duplex, or customized for unusual echo and line feed combinations.

Disk functions are accessible from DOS without losing data from the host computer. The disk directory can be viewed, files erased, a file displayed, the default drive changed, and the directory path may be changed.

File send and receive functions allow a choice of character-by-character transmission such as ASCII or the XMODEM protocol. RS-232 options change Baud rate from 50 to 19.2K, data bits from five to eight, one or two stop bits and parity from none to even/odd/mark or space. Errors are tracked and explained, RTS and DTR are turned on or off and an RS-232 adapter may be selected for any of four serial ports.

The phone number directory sets up a separate file with customized communications settings for each BBS, remote computer or online service. Macro keys are defined for answer back, user name, or other commands. *Omniterm 2* also adds a comment line with every file setting, which is most useful for making notes about the peculiarities of each system.

The automatic dial and logon feature is simple to use. A dialing prefix is defined to ready the modem to dial the number. The suffix instructs the modem that the phone number has been entered and to start dialing. Examples of prefix and suffix commands for most popular modems are given in Appendix F. Watch out for the Hayes ATDT prefix, however. The dialing prefix must be in uppercase letters. The program does not automatically convert lowercase, and if capital letters are not used, the Hayes will not auto-dial. When transmission is ended, the line hangs up.

Up to 64K of the available memory is available in the scroll back buffer, the file receive buffer holds another 25 percent of free memory, and the rest is for the printer buffer. If the printer or file receive buffers reach capacity, *Omniterm 2* sends a pause to the remote system.

When writing to disk, the program opens a file, writes to it and closes the file, rather than putting additional data in an already-open file. In the case of a power failure or telephone transmission problem, the data in the file is recoverable as far as the last buffer write. Most communications software I've used doesn't have this nifty feature.

Omniterm 2 has a great option for downloading XMODEM files. After a filename is entered, a prompt warns if another file with the same name already exists. You can replace the old file, append with the new information, or quit and choose another filename.

The program receives one 128-character block at a time, and checks for errors in transmission. After the data has been successfully received, the file is saved to disk, the program beeps and returns to the main menu. Appendix G has an excellent explanation of the mysteries of Christensen or XMODEM protocol.

With an auto-answer modem, *Omniterm 2* allows unattended host operation. Those who have wanted to be the sysem operator of their own BBS can do it with this program. When a remote computer calls, the program detects the call and prints a message set up in the answer back string. The caller is asked for a password, and after three incorrect tries, *Omniterm 2* disconnects the caller.

After the calling computer is accepted, a remote host menu appears, giving the caller options to send or receive with XMODEM or with ASCII, a disk

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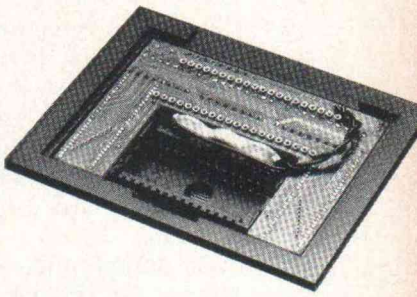

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You push a function key and you are in the second bank. Push again and you are in third, again, then fourth. Press it once again for your original bank.

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What is really great is that you can copy a file from one bank to another with just a function key.

Each bank is like having another Model 100, and all the built-in programs as well as any snap-in ROM programs appear in all four banks and work the same way. Your widebar cursor moves from file to file and you access any file or run any program just by pressing ENTER.

What lets you copy any file from one bank to another is a snap-in ROM from PCSG called RAM+, that comes at no extra charge. It just pushes right into the little socket in that same compartment with the 96K expansion unit.

Not only does this firmware let you copy a file from bank to bank, but you can make a copy of any file within the same bank instantly with a function key. Great for Lucid spreadsheets!

Copy a file from bank to bank with a function key

You can also rename a file, or kill any file with just a function key. Plus you can do a whole lot of other useful things like setting the date, day and time with function key ease. You even have a function key that lets you use non-Radio Shack printers without having to make those tricky dipswitch settings.

RAM+ lets you cold start any one of your banks without affecting the other three. That means that anytime you want you can clean out a bank's entire memory, but leave intact all the files in the other banks.

What is also fantastic is that you don't have to have the ROM in place to use the additional RAM. Whenever you take out the snap-in ROM it leaves behind a tiny machine code program that lets you switch from bank to bank just by pressing ENTER.

This lets you use your ROM socket to snap-in other ROMS like LUCID spreadsheet, WRITE ROM text processor, or DISK+ ROM file transfer program, and use them in any or all four banks. All of these, by the way, are available from PCSG.

When you are ready to copy a file from one bank to another or use any of the other fantastic functions we talked about you can just snap the RAM+ ROM back into place.

Everybody that has this 128K system in their Model 100 is so excited, because it gives them four times the capacity and all banks work just like the Main Menu.

And what has made a lot of people happy is that the system bus, located in the same compartment, is left free for you to plug in a DVI or the Holmes Engineering/PCSG portable disk drive.

The ability to copy a file from bank to bank instantly with a function key, plus all of the other features make this RAM extension truly an engineering masterpiece.

Some people hesitate when they think of installing something, and then others are skeptical that any additional hardware could be as good as the Model 100 itself. That's why we sell these 96K expansions on a 30 day trial. Simply return it within 30 days for a full refund if you are not satisfied. Priced at $425. MC VISA COD.

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directory, chat with host system operator, print data on host printer and hang up. The program shows the connect time and the current date and time the caller exited the system.

An excellent security feature with the host mode is restricted access to any drive or directory path except the default drive and path. A special host directory holds files that are available to the public, and callers cannot read data stored in the hard drive nor in other directories.

I had some difficulty setting up the dialing codes for use with my MCI long distance service, so I sent a "help!" request to Lindbergh Systems via CompuServe. They answered promptly and explained step-by-step how to enter the pause and user ID codes.

Omniterm 2 is the greatest communications software I've ever used. The scroll back and constant file save features are extremely helpful. The ease of operation, plain language menu choices and versatility of the package are excellent. Who knows, I may even start my own BBS using *Omniterm 2*.

— M.J. Batham

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SOFTWARE

Better Basic Lives Up to Its Name

Is *Better Basic* better? I think so. If I made a list of things that would make writing BASIC programs easier, the following would top my list:

1) Subroutines that could be called by name instead of line number to improve readability.

2) Local variables and line numbers in those procedures that would not conflict with other areas of the program.

3) Error checking, at least for syntax and valid keywords, as program lines are entered.

4) The ability to write and read records to data files without worrying about disk buffers and type converting.

Better Basic does all of the above and much more. The version I tested was for the Tandy 1000, 1200HD and IBM PC, but it seemed to run on the Tandy 2000, as well. A version specifically for the 2000 is also available. The manual runs over 500 pages and covers *Better Basic* completely. In addition to the manual, the second disk in the package had a demo program that nicely demonstrated many of the features.

The programs necessary to run *Better Basic* are not copy protected and can be backed up. There are about five different files that must be online at run time, however, they only take up about 89,086 bytes of disk space. The manual is very explicit about which files are required and describes the installation procedure in great detail. Reference is made to the *Better Basic* compiler, but be aware that this really refers to the compilation of the extra features. The program actually executes as interpreted BASIC.

Once you have the disks set up, typing B from DOS loads *Better Basic* and gives you a blank screen with a reverse bar across the bottom line. The bottom line tells you that the "autodefine" feature is on and that you are in the main program.

This leads to one of the more interesting features of *Better Basic*. *Better Basic* sets up "work spaces" and

the name of the currently active work-space shows on the bottom line of the screen. The main program work space is just like the environment provided by regular BASIC and you may enter program lines in the normal manner. The difference comes when it is time to write a subroutine.

In *Better Basic* you name a procedure. For instance, you might like to have a routine to stop execution of the program until a key is pressed. Rather than just writing this as a subroutine, you would type PROCEDURE PAUSE. This causes *Better Basic* to set up a new work space called pause. The screen is again blank and the bottom line tells you that you are in the pause work space. You may now write your subroutine. The difference is that the line numbers you use and the variables you declare are "local" to the PAUSE work space.

This means you can start the procedure at Line 10 even if you have a Line 10 in the main program. If you write a lot of procedures of subroutines, this is a very handy feature. Now you never inadvertently clobber other sections of code by reusing a line number. The same thing applies to variable names. The loop counter K you use in the PAUSE procedure is different from the K you used in the main program (or any other subroutine).

Making a mess with "side effects" like these is a common problem in regular BASIC if you write long programs. Maybe the best part of all is that in your main program when you want a pause, you use the name of the procedure PAUSE as if it were a BASIC keyword instead of having to use GOSUB to a line number. Consider the following two-line 150s for readability:

```
150 GOSUB 8000
150 PAUSE
```

The first is regular BASIC, the second is *Better Basic*. Since PAUSE was defined as a procedure, subsequent uses of the name call the procedure like a GOSUB command.

While the local nature of the variables used in procedures makes writing programs easier, there are times when a procedure needs a value from the main program to do its job. *Better Basic* makes provision for this possiblity. At the beginning of a procedure a variable may be declared to be an argument variable.

When the procedure is called by the main program, a value of a variable name follows the procedure name. This value is passed to the procedure and is available in the procedure as the argument variable. The argument, however, cannot be changed in the procedure. For instance, a procedure called DELAY would be passed a value representing the length of the delay. This value would be an argument of the procedure and could be used but not changed.

Sometimes the purpose of a procedure is to change something. In this case the item to be passed to the procedure should be declared as a variable argument rather than an argument variable. Another example may clarify that bit of "gobbledygook." If you wrote a procedure called INCREMENT, you would want it to change the variable from the main program. Declaring a variable argument would allow you to expect INCREMENT COUNT to increase the value of the variable COUNT by one.

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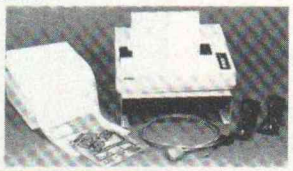

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Better Basic won't let you get away with many errors either. Each line is checked for errors as it is entered. If there is an error in a line, the error is flagged immediately and the line does *not* become part of the program. The offense is pointed out with an error message and a ^ pointing at the spot where the error occurred. Not every error can be detected, but punctuation, type mismatches, illegal keywords and unknown procedure names are all checked. This does make a lot of sense. It has always seemed silly to me that I had to run a program to find out I had made a typing error.

Better Basic has integer and string variable types that are the same as regular BASIC. It also has some different types that are useful. The type "byte" is similar to integer, but it only occupies one byte instead of two. Its value is limited to a maximum of 255, but this will suffice for many applications.

Rather than single and double precision, *Better Basic* has the type "real." The user may specify the level of precision of real variables. The PRECISION command is given an argument between six and 24. PRECISION is a global command and applies to all real variables in the program.

Better Basic also has a constant type. Once a constant has been declared, its value may be used but not changed. This feature eliminates the inadvertent changes possible in regular BASIC. There is also a pointer type of variable. Any regular variable may be referenced directly by using its name, or indirectly through a pointer that points to the memory location the variable occupies. Pointers are useful in creating linked data structures.

Better Basic allows the definition of complex data types called records. For instance, a teacher might want to have a record called STUDENT. This record would contain a name field (string), an ID number (integer) and a grade point (real). Once declared, STUDENT can be used as a type in declaring other variables. An array of students would allow manipulation of a list of students using only one array despite the three types of data. Even nicer is the ability to write a student record to a disk file without having to convert the integer and real portions. There is no FIELD command in *Better Basic* and no buffer to worry about.

Well, I have pussy-footed around the variable declaration issue long enough. This is one feature of *Better Basic* I like, with reservations. As mentioned above, *Better Basic* boots up with the autodefine feature turned on. This means you may write code as you always have in BASIC just using a new variable when the need occurs. *Better Basic* in this mode will write a declaration statement for you. The next time you list the program procedure, the variable you used will be listed in the declarations. The type assigned to the variable will reflect the type implied by its first use.

My reservations stem from the fact that once a variable has been declared, either explicitly by the user or automatically by *Better Basic*, its type cannot be changed — *ever*. The autodefine feature has gotten me in trouble when I used a new variable in an input statement. *Better Basic* decided this was a real variable and declared it so. I wanted it to be a string, but nothing I could do would change the type. Even when I was being diligent and declaring an array explicitly, I forgot that an array of 12 would only go from zero to 11 and referencing the 12th member would cause an error.

I tried in vain to redefine the array to have 13 members. Maybe the answer is to turn the autodefine feature off. Now, using a new variable on the fly will generate an error as the line is entered because the variable is undeclared. You will then have the opportunity to declare the variable the way you want it.

Graphics commands are supported in *Better Basic*, but I could not test them as I have no graphics board, but I did have a good time with the window commands. You can define a window by giving its upper left and lower right corners. Now when you want to open the window, the SELECT command pops it open. A FRAME WINDOW command draws a very nice border around the desired window. CLW clears the current window and CLS restores the full screen. Selecting a new window closes the previous one and opens the new.

Better Basic includes a variety of program control structures. FOR-NEXT

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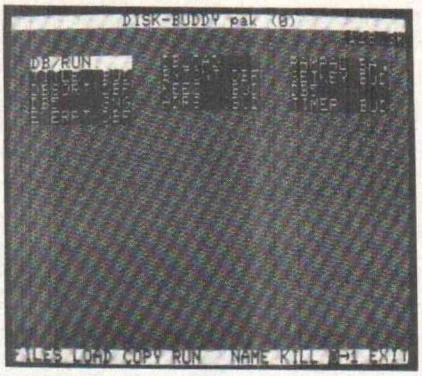

- Also: Features to run, load, save, sort, kill, measure, append, and name, disk files and RAM files, and much more.

PCM Magazine (March, '85) said: *". . . an excellent buy" . . . "manual is extremely well written" . . . "will substantially increase the speed and ease of operation of the M-100 with the D/VI."* PCM

That was the idea in the first place.

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loops are there, of course, but a DO loop is included. This loop may be done a specified number of times or done until an exit command is executed, or the loop may end in a conditional repeat command. WHILE loops are also supported. Even though line numbers are used for the statements within the various loops, *Better Basic* does not permit a GOTO into or out of one of these structures. The only way in is from the top and the only ways out are the end of the loop or an EXIT statement. This discipline takes some getting used to, but it makes for better programs and makes following the logic of a program easier.

If you have read this far, I guess I owe you a summary. *Better Basic* lives up to its name. It incorporates many of the best features of PASCAL and includes features not available in regular BASIC. The program works and the documentation is good. There are some deficiencies, but I assume they will be corrected in the new edition.

If you want a way to write better documented, more readable BASIC programs, *Better Basic* may be for you. I think that skimming a PASCAL text would be of benefit to a programmer who has used only regular BASIC. It is not absolutely required, but it would make some of *Better Basic*'s concepts easier to understand.

The system requires 128K (256K to do anything useful).

(Summit Software Technology, P.O. Box 99, Wellesley, MA 02157, $199.95)

— Potter Orr

SOFTWARE

Bar Code Drivers

If you want to read UPC, Codeabar, or interleaved 2-of-5 bar codes, this is the software for you. It does the job, though the documentation is poor. The manual should warn you of the dangers of using machine-language device drivers.

What You Require

To read bar codes you need a Model 100 computer, a bar code wand and a bar code software driver. If you wish to read Plessey, 3-of-9 or full-size Universal Product Code (UPC) codes, you do not need the product reviewed here; you need only the Radio Shack wand (Cat. No. 26-1183, $99.95) and one of the drivers supplied with it. (The wand was reviewed in the March 1984 issue of PCM.)

If you wish to read all UPC codes, including the smaller codes found on small consumer goods, or if you are working with 2-of-5 or Codeabar codes, then you need this product and a wand. (Most people would just use the Radio Shack wand but the standard Hewlett-Packard wand, which is electrically identical, will also do the job.)

What You Get

You get a cassette with eight programs, listed in Table 1. It comes in the standard padded vinyl Radio Shack binder with a nine-page manual.

The first four programs are used with a non-disk Model 100; the others are nearly-identical versions modified for execution below the D/VI system RAM area. File sizes are listed, but don't forget that a CO file may take up memory twice — once where it has been saved among the directory files and again where it has been loaded in the execution area.

Table 1. Bar Code Driver Software

Program	Size	Function
I2OF5.CO	797	Interleaved 2-of-5 driver, non-disk version
CDABR.CO	915	Codeabar driver, non-disk version
UPCEAN.CO	1013	UPC driver, non-disk version
RDBC2.BA	777	BASIC demonstration program, non-disk version
I2OF5D.CO	797	Interleaved 2-of-5 driver, disk version
CDABRD.CO	915	Codeabar driver, disk version
UPCEAND.CO	1013	UPC driver, non-disk version
RDBC2D.BA	779	BASIC demonstration program, disk version

Installation

It is pretty easy to load one or more drivers from cassette into the Model 100. A demonstration program, provided, does a good job of showing how easy it is to read bar codes. You can test out the UPC driver by reading full-sized codes (such as those on the cover of this magazine) and small codes, such as those on soft-drink cans. A good source for a sample codeabar code is a Federal Express airbill.

Documentation

The manual is poor. It provides no sample bar codes, so there is no way to test the software. A chart on Page 3 of loading locations is incomplete and misleading. There is no index, and a mistake on Page 2 makes it impossible to load the UPC driver. (HIMEM should be set to 61752, not 62765.) It is only nine pages long, explains little about the BASIC statements that may be used with the wand, and gives no warning about the importance of backing up user files. It is supremely important to use CALL 61807 when the BASIC program is finished, but the manual merely says this is necessary to "prevent an error condition" when the real reason is that destruction of user files is almost a certainty if the CALL 61807 is forgotten.

Radio Shack distributes upgrades of software through items with catalog numbers in the 700 series; they are unpublicized and one learns of them by accident. The one valuable piece of information in the manual is the mention of catalog number 700-2401, a set of drivers which allows owners of the D/VI to read Plessey, 3-of-9 or full-size Universal Product Code (UPC) codes.

Customer Support

Radio Shack maintains customer support phone numbers in Fort Worth, with which most Model 100 owners are familiar.

(Tandy Corp., One Tandy Center, Fort Worth, TX 76102, $19.95, special order through Radio Shack stores nationwide)

— Carl Oppedahl

How It Works

When a bar-code wand is connected to the Model 100 or 200, the data may be obtained by inspection of input port BB. To see this, run a simple BASIC program:

```
1 IF 8 AND INP(187) THEN
  BEEP:GOTO 1 ELSE 1
```

When the bar is activated and is touching a reflective surface, a beep will be heard. When a wand is scanning a code, BASIC cannot keep up with the light and dark parts of a bar code, so machine language must be used. One choice for the sophisticated programmer is to write a machine language program to convert the serial data from the wand into useful data. But for most users, the convenient choice is to use an existing machine language driver such as that reviewed here or included with the wand.

The driver sits in the protected area between HIMEM and MAXRAM. In each computer, the ROM routines that handle the BCR socket rely upon hooks in the system RAM area (above MAX RAM). The hooks include a handler for the RST 5.5 interrupt which occurs when a white region is scanned; a handler for an attempt to OPEN "WAND:" FOR INPUT (which sets up a file buffer); and a handler for BASIC commands like INPUT$, LINEINPUT and INPUT. When the computer is cold-started, the hooks assume values that generate ?FC errors whenever the WAND device is used.

The drivers are designed so that when they are executed via the RUNM command, a routine at 61824 (or 56960 in the disk version) modifies the BCR hooks. As a result of this installation, when the wand is opened, the "open" hook leads to a part of the driver rather than to a ?FC error. Similarly, an INPUT from the WAND device leads to a part of the driver rather than to a ?FC error.

If by chance a different CO file is loaded, the stage is set for the loss of user files. A later attempt to OPEN the WAND: activates the "open" hook, which passes control to some address within the different CO file. In general, the machine language code there will not run right, and may lose all user files.

Radio Shack has made provision for tidying up the RAM hooks; a routine at 61807 will return the WAND hooks to their previous values, protecting everything. One glaring problem with the manual is that it only mentions the routine at 61807 in passing — it is in fact an essential part of any BASIC program using the driver. The demonstration BASIC program, to its credit, does illustrate a way to be reasonably sure of resetting the hook values.

Tandy 200 Use

The BCR connector and pin designations of the Tandy 200 are identical to that of the Model 100. In each computer the scanning of a white region generates an interrupt to the CPU and changes Bit 3 of CPU input port BB. The two have nearly identical BASIC in ROM (though at different locations) with analogous provisions for adding the WAND: device. As a result, the software driver necessary for decoding a given type of bar code should be nearly identical for the two machines.

Regrettably, the ROM, nonetheless, differs in the 200 (the RAM hooks are in different places), and the difference is great enough that the drivers must be rewritten for the 200.

Another reason the Model 100 BCR drivers cannot work in the Model 200 is that any driver must be assembled to fit just below the MAXRAM address, and MAXRAM differs in the two machines.

Fort Worth tells me that drivers for the 200 will be available soon.

Golden Oldies: A Blast From Computing's Past

"I found my thrill
On Blueberry Hill
On Blueberry Hill
Where I found you"

Radio stations and record companies have been making millions for years with "Golden Oldies," those great hits of the past that somehow twang a special chord in our hearts and memories.

But songs, great as they are, are not the only "Golden Oldies" to be praised, enjoyed and honored by our memories.

Remember the very first time you played *PONG*? I do. 'Twas in a place called Shenanigans in Chicago's Rush Street area. So much did I like it that I bought a whole portable video game from Magnavox just to be able to play it on my own TV. Cost of that little adventure? $200.

And speaking of Adventures, how about the original one? The travel through the Colossal Cave to fun, fantasy, pirates, dwarves and twisty little passages all alike?

The first time I played the Original Adventure, it took me a good hour to figure out how to get in the cave at all — and a couple of hours to solve the mystery of getting past the snake. I remember the sheer exaltation when I did it — I even called a friend long distance to tell him!

Do these classics compare with The Coasters, Buddy Holly, Elvis and Chubby Checker (who Dick Biande of WLS once said was "a fat taxi cab")? You bet!

"It's one for the money
Two for the show
Three to get ready
Now go, cat, go
But don't you step on my Blue Suede Shoes"

A company named Software Country has put together what I consider to be a "must" list for everyone who has any sort of interest in — or nostalgia for — personal computing. It is called *Golden Oldies* and features Tandy 1000 and 1200 versions of the original *PONG, Adventure, Eliza* and *Life*. Do these programs need explanation? Probably not.

Still in all, *PONG* is the original arcade game, and in these versions can be played in either black and white or color, one person or two. *Adventure* is the original version of the great Wil Crowther/Don Woods hit. *Eliza* is the original "artificial intelligence" program which resembles a psychiatric session. You type in comments and Eliza asks you questions. It isn't real, but it is a lot of fun. *Life* is that famous game that isn't really a game at all in which you set up individual cells on the screen and they either give birth to new ones or cause the death of old ones according to their proximity to one another. There are some classic starting patterns stored on the disk, as well as some interesting variations.

I know that when I got my first personal computer, I searched for months trying to find a version of *Adventure* that would run on it. I was addicted to the game. In its original version, *Adventure* was the classic "text" Adventure — and all in whatever color the screen would handle. This version has been livened up with your commands in one color and the computer's responses in another. There is also a "save game" feature!

A real blast from the past!

"Went to a dance
Lookin' for romance
Saw Barbara Ann
So I thought I'd take a chance"

Here's the Barbara Ann of Software. And only $29.95

Golden Oldies comes with a 40-page bound book (I'd hate to call it a manual) that spends most of its space explaining the history of the four programs and bringing out some of the flavor of them — including Tracy Kidders' Pulitzer Prize winning "The Soul of a New Machine" essay on *Adventure*. The book itself is a joy to read, a "Book Of Love" to the greatest computer software classics ever.

Finally, recognizing that *Golden Oldies* have been adapted for what are, essentially, business machines, Software Country has added a nice little touch too often missing from software today — a touch of humor.

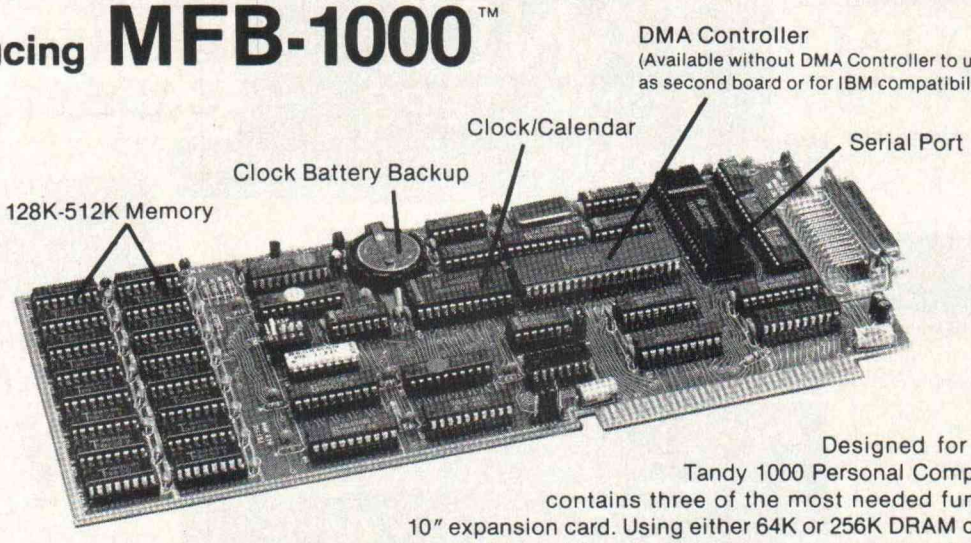
If "your supervisor or the *Big Boss*" walks in your office while you are playing, there's a "panic button," CONTROL-P, that will quickly erase your screen and put a "spreadsheet tutorial" display on your monitor for the boss to see how hard you're working. That way, playing on company time won't force you out into the streets to "Get A Job" (*Yip-Yip-Yip-Yip, Boom-Boom-Boom-Boom)*!

These are programs you *should* have. They are faithful adaptations of the classics which, as classics, will certainly live forever and ever. Or, at least, as Johnny Mathis once said, until "The Twelfth Of Never."

(Software Country, distributed by Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403, 415-572-2787, $29.95)

— Lonnie Falk

Introducing MFB-1000™



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Cheapware's *Label Maker* is Adequate, Affordable

If you have ever needed 9,999 labels to place on jars of home canned tomatoes or an unlimited supply of return address labels for your home or business then the *Cheapware Label Maker* may be for you. A short understandable manual accompanies this simple-to-operate program and together they adequately fill a need.

The 18-page manual explains the typefaces, fonts and program functions which are available. The manual starts out with a brief description then immediately jumps to a semi-technical discussion of how to manipulate the different program and data files. It is helpful to have some prior understanding of file manipulation, but even the beginner computer operator, after reading the section once or twice, would be able to follow the directions.

The three typefaces and four fonts that are available give the program its versatility. Several of these are available only on a dot-matrix printer and the combinations are limited. The labels may be printed in standard typeface, bold typeface or enhanced typeface. Bold typeface and enhanced typeface may supposedly be combined for a very dark impression. Because there was no apparent difference between the three dark prints when this program was tested, one option would have been adequate.

Four fonts are also available. These are normal (elite), pica, expanded and condensed. It gets somewhat confusing when printing in pica or condensed print. The third label across the page ends up being several characters shorter than the first two labels. Also, emphasized typeface is not available in either of these two fonts. This program was tested on a Daisy Wheel II printer and an Epson FX 80 printer. The print quality was excellent on the Daisy Wheel printer but the different fonts were, of course, not available. Unfortunately, they did not work on the dot matrix printer either. While the manual states that the program requirements only include "a dot matrix printer," apparently this is not so. I would not purchase this piece of software without first obtaining a guarantee that it will support your dot matrix printer.

The typefaces and fonts are easily activated by pressing the CONTROL key and a letter. For ease of remembrance, a handy help screen will display all the control combinations at the bottom of the screen. This portion of the screen may also be toggled to blank when not needed.

Five simple program functions run the program. All of these operated smoothly. The user may save label information, load label information, delete a label, type a sample label or write a label. Each of these are readily activated with a CONTROL key combination. The program will print as many labels as needed, up to 9,999.

For the more sophisticated user, two other niceties exist. It is possible to insert a serial number on the label. It will start at any digit and print up to the number 9,999,999. Another very nice feature of *Label Maker* is the ability to insert text from a sequential file as it is being printed. While all five lines of the label are available for input from files, each line must carry a unique filename. This option is not intended to be used to create mailing labels. For as the programmer puts it, "I have another program you may purchase which contains this function ... *Cheapware Letter/Manuscript Writer*."

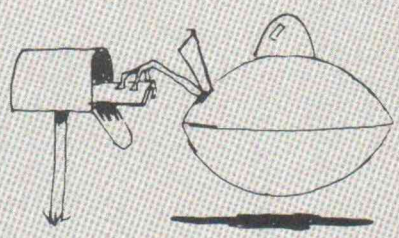
As an added bonus, 3,000 labels accompany your original order. It is helpful to see the labels to understand the line length differences explained in the manual. The labels are standard labels with three labels across the page and 12 down. They are available from any office supply house or may be ordered directly from the manufacturer of *Label Maker*.

While *Label Maker* does not come with the "Pomp and Circumstance" or frills of some other packages, it, to a certain degree, does what it is supposed to do, and at a very affordable price. It also contained many misspelled words in the demo documentation. For the home user or small businessman, *Label Maker* can adequately fill a need.

(Robert L. Nicolai, 4038 N. Ninth Street, St. Louis, MO 63147, 314-621-7618, $45)

— Melanie Debusman

PCM



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Back copies of many issues of PCM are still available.

All back issues sell for the single issue cover price. In addition, there is a $2 charge for the first issue plus 50 cents for each additional issue shipped in the U.S. When possible, issues are shipped UPS. The postage cost in Canada and Mexico is $3 for the first issue and $1 for each additional issue.

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SOFTWARE

Smart Cook: Try a Few Bytes Before Deciding

May I suggest a software package that you can really sink your teeth into? It's called *Smart Cook* from LeCom Enterprises.

Smart Cook is an electronic recipe cardfile with each disk containing approximately 40 recipes. Each recipe has preparation instructions for both microwave and conventional cooking.

Operation of *Smart Cook* is very easy with selection of recipes and various options being handled by on-screen menus.

LeCom has utilized the number crunching capabilities of the Model 1000 in designing *Smart Cook*. You are given the options of choosing a recipe with proper ingredient portions from one to 24 servings. The 1000 and *Smart Cook* recalculates the amount of ingredients necessary for the varying number of servings.

Smart Cook is delivered in a "Book-of-the-Month-Club" type format with the subscriber receiving a new disk every month. Each disk contains only recipes from a particular category. The categories are: 1) Appetizers and Snacks, 2) Soups, Stews, Sauces and Gravies, 3) Vegetables and Salads, 4) Eggs and Cheese, 5) Meats, 6) Poultry, 7) Fish and Seafood, 8) Breads, Sandwiches, Rice and Pasta, 9) Desserts, Pastries and Beverages, 10) Cakes and Cookies, 11) Holiday and Nationality Favorites and 12) One-Dish Meals. At the end of a year, the category repeats but the recipes change.

Each recipe can be printed to eliminate the need for leaving the 1000 on the countertop next to the toaster.

A list of ingredient substitutions is included on the disk for the ingredients used in the recipes.

The *Smart Cook* program is well-written with no apparent bugs. The user is prompted with available options on the screen and incorrect responses do not bomb the program.

A companion, but separate, program called *My Very Own Recipes*, allows the user to enter his or her own favorites and use the features of *Smart Cook* to change the ingredient portions for the number of people being served.

My Very Own Recipes requires two disks: one for the program, and one for the recipes. About 40 recipes can be stored on each disk. By adding additional disks, the library of your recipes is unlimited.

Although the program is well-written and executed, I do not find it to be terribly practical.

Using *Smart Cook*, a four course meal would require accessing four disks to obtain each recipe. The user does not have the capability of changing the recipes on the disk to accommodate variances in microwave power, altitude (very important to this Colorado resident) or personal taste. With the *My Very Own Recipes* program, of course, the recipes are customized to the user's taste as they are entered.

Compared to established printed cookbooks, *Smart Cook* is a questionable value. A one-year subscription at $13.50 per month would give you approximately 480 recipes for $162.00. *My Very Own Recipes* seems to be a better value at $24.50.

A desirable feature not included but one which could be easily added is the capability to do menu and shopping planning for a week by choosing meals for the week in advance and having the 1000 add and store the necessary ingredients and print out a cumulative shopping list.

For those curious about *Smart Cook*, there is a demo disk available which contains a selection of recipes from the various categories.

(LeCom Enterprises, Box 346, Winfield, IL 60190, one year subscription, $13.50/month)

— Bruce Rothermel

Princeton, New Jersey — the place to be October 11-13. See our inside back cover.

World Book Introduces Educational Software

World Book Discovery, Inc., a subsidiary of World Book, Inc., introduced its *Discovery Software* for Apple and Tandy 1000 computers at the International Consumer Electronics Show (CES) in Chicago. *Discovery Software* currently marketed for the IBM PC*jr* and includes 21 interactive programs which teach and reinforce essential learning skills for children ages 3 to 10 and up.

Discovery Software series provides a complete set of learning tools carefully designed to meet the needs of the preschool and school-age child and promote the joy and the challenge of learning through discovery, claims World Book.

Discovery Software is organized into three series: preschool, for ages 3 to 5; primary, for ages 6 to 10; and intermediate, for ages 10 and up. Each series is available as a package of seven programs at a suggested retail price of $249.95. Individual programs may also be purchased separately at a suggested retail price of $39.95. Each program is supported with a workbook of activities, projects and suggestions for games which parents can use to reinforce specific learning skills.

World Book, Inc., The Merchandise Mart, Fifth Floor, Chicago, IL 60654

New PaperJet™ 400 Triples Hewlett-Packard LaserJet™ Paper Capacity

Ziyad has introduced an automatic sheet and envelope feeder for the Hewlett-Packard LaserJet™ which more than triples the paper capacity of that laser printer.

The Ziyad PaperJet™ 400 consists of two paper trays and one envelope tray which are housed underneath the LaserJet. With the paper feeder, a user can print up to 450 sheets of paper and 75 envelopes without refilling the paper or envelope trays. The 400's two adjustable paper trays store and feed standard, legal, executive (monarch) and European DIN sized paper.

Because the LaserJet and PaperJet 400 combination offers a total of three paper trays, a user can stock, feed and print up to three different types of stationery and bond paper without having to manually change paper. This makes it easy to intersperse within one document different sizes and types of paper and envelopes for correspondence, graphs and spreadsheets.

The PaperJet 400 is compatible with Hewlett-Packard, IBM and IBM-compatible computers and word processing systems that use the LaserJet printer. And, it operates with the same word processing software as the LaserJet.

The Ziyad PaperJet 400 Third Party Solution is available through all authorized Hewlett-Packard dealers and VARS. The price is $1,895.

Telescan Inc. Announces Investment Software And Online Database

Telescan Analyzer is a color graphics stock analysis program which accesses the Telescan Financial Database of over 7,000 stocks and indices, updated daily. In seconds, the program displays up to 12 years of historical data as individual customized technical or fundamental stock graphs.

Technical Analysis includes both simple and exponential moving averages, cycles, momentum, momentum moving averages, trendlines, on-balance volume, relative strength and short interest. Fundamental analysis includes insider trading, earnings, dividends, book value, cash flow, capital spending, inflation adjustment and proprietary indicators.

All New York Exchange, American Exchange and NASDAQ Over the Counter stocks are listed in the database, and are updated daily.

The Telescan package retails for $395.00 and includes the program and a year of the Software Maintenance Package, along with an 800 support number. Connect charges, via Tymnet, are $10.00 per hour prime time and $5.00 per hour non-prime time, in major cities. There are no monthly minimum fees.

System Requirements: IBM PC, PC-XT, PC-AT, PC*jr*, Compaq, 100% IBM compatibles, 256K, Hayes Smartmodem or compatible (1200 Baud), color graphics.

For more information, contact Telescan Inc., Suite 600, Houston, TX 77042, (713) 952-1060.

Portable Power System For Briefcase Computers

Prairie Power Systems, Inc., has announced a new portable battery system and carrying case that greatly extends the power capabilities for most lap-top computers.

Popular briefcase computers such as the Tandy 100 and 200, NEC 8201 and 8401, Epson lap-tops, Hewlett-Packard 110 and Sord's IS-11 series will benefit by the Prairie Power battery and carrying system.

Prairie Power claims that the new product can greatly extend computing time on the Tandy 200. For example, the power system provides up to 160 hours of continuous usage while normal "AA" life on the Tandy 200 provides a mere 10-15 hours.

The complete computer and battery system is housed in a water-resistant carrying case. The soft-sided Cordura® case is fully padded and features a removable PVC insert panel that can be used as a lap-top work station. The case is attache size (17 by 13 by 5 inches) and will easily fit under any airplane seat. The case, battery and charger with the Tandy 100 weighs 12 pounds.

The case features thick foam protection that holds the battery, charger and computer. The case also has room for acoustic cups, cables, a small recorder or the new line of 3½-inch disk drives, protected in a special padded pocket. The complete system will be sold for $169.00 (includes case, shoulder strap, Model 10 battery, charger and cables).

More information is available from Prairie Power Systems, Inc., 1-800-435-8721.

Concepts Computerized Atlas™ Lets Users "Travel By Cursor"

Software Concepts, Inc. now presents geographic facts, figures and distances, 3-D color displays of the globe and more in IBM® PC and compatible system software. *Concepts Computerized Atlas*™ geographic information software is available for $69.95 at participating Software Concepts' dealers.

Pop-up menus let users change the size of the globe (ten zoom levels); see facts about cities, states and countries; rotate the view to center on any of the seven continents or on the current cursor position; and more.

Minimum system requirements are an IBM PC or compatible, IBM PC*jr*, Tandy™ 1000 or Tandy 1200; DOS 2.0 or 2.1; 128K of RAM, one disk drive, a graphics board and a color monitor. *Atlas* is also available for the Tandy 2000. For additional information contact Software Concepts, Inc., 1116 Summer Street, Stamford, CT 06905; (203) 357-0522.

Flagstaff Software Solves Disk Incompatibility

Flagstaff Disk Conversion Equipment, a distributor for Flagstaff Engineering's *Word Connection* and *Diskette Connection*, is marketing the systems which are used to transfer document files between most word processing systems and the IBM PC, XT, AT or true compatible.

Diskette Connection hardware system consists of an 8-inch drive, a cable and a special controller card for the PC. This system allows you to read and write most 8-inch, 5¼-inch or 3½-inch diskettes.

The *Word Connection* programs used in conjunction with the *Diskette Connection* system, allow you to transfer document files on diskette between most word processing systems including CPT, Displaywriter, OS/6, NBI, Xerox, Wang, IBM S/32, S/34, S/36, S/38, etc., and CP/M systems.

The conversion of data is fast, transferring 40 pages of document per minute. The transferred documents can be sent directly into mainframe computer systems using IBM's PROFS and DISOSS electronic mail system.

The *Word Connection* programs use IBM standard Document Content Architecture (DCA-RFT) to transfer document files and parameters such as page size, margins, tabs, headers and footers, type style, proportional spacing, multilingual characters, merging of graphics and text and typesetting control characters.

The *Word Connection*, priced at $695, and the *Diskette Connection*, priced at $1,099, are available from Flagstaff Disk Conversion Equipment, 1805 N. Beaver, Flagstaff, AZ 86001, Call 602-774-5422, or 1-800-821-7493, Ext. 236. □

Only $24.95

COCO-UTIL

"The Connecting Link"

CoCo-Util is a valuable utility program that allows you to transfer Tandy Color Computer disc files to your MS-DOS machine. You may also transfer MS-DOS files to a Color Computer disc. CoCo-Util will save you countless hours of retyping . . . a great new utility.

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Using *BAREAD 2.1*

Bar code listings must be read in numerical order beginning with Line 1 and continuing through the last line of the listing. The computer display is used to prompt you as to which line to scan and give you warning messages should you happen to get out of step.

When you run *BAREAD*, it asks you to scan the first line of the bar code listing. This line contains the name of the program as well as the beginning of the program itself. The computer will sound a high-pitched beep whenever it's ready for you to scan a line. After a line has been successfully read, you'll hear a lower beep. A "blip-bloop" sound prompts you to turn your attention to the screen for a message. You'll hear this when you accidentally scan a line out of sequence.

After reading the first line, you continue scanning with the second line. Remember to wait for a high beep before scanning and then listen for a low beep to indicate a successful read.

Once the last line of the listing has been scanned, *BAREAD* will return control to the Tandy 100/200 menu screen. Note that the program you just scanned is now in the directory with a .DO extension.

The final step is to convert the .DO text file to a normal BASIC program. This is done quite simply by going to BASIC and loading the file with a command such as LOAD"TEST .DO" (if the program name were TEST). The program will load into BASIC and will be ready to run. To save the program in BASIC's compressed format (.BA extension), you'd type SAVE"TEST" (if the program were named TEST). You may then kill the .DO file with KILL "TEST.DO".

```
1000 ' *** Initialize ***
1010 ON ERROR GOTO 1040
1020 CLEAR 1000:MAXFILES=2
1030 GOTO 1050
1040 IF ERR=5 THEN RESUME NEXT
1050 ON ERROR GOTO 0
1060 RUNM "B30F9"
1070 OPEN "WAND:" FOR INPUT AS #1
1080 UC%=-1
1090 PC$="0123456789ABCDEFGHIJKLMNOPQRST
UVWXYZabcdefghijklmnopqrstuvwxyz- $+"
1100 DIM RW$(36)
1110 ER$(1)="You must scan line 1 first!
"
1120 ER$(2)="You've SKIPPED a line!"
1130 ER$(3)="You've ALREADY SCANNED this
 line!"
1140 ER$(4)="Code not PCM2/39 format!"
1150 ER$(5)="Command not applicable here
!"
1160 ER$(6)="You cannot skip this line!"
1170 ER$(7)="Selected resume file not in
 computer!"
1180 ' *** Read Reserved Words List ***
1190 DATA BEEP,CLEAR,CLOSE,DATA,DEFDBL,D
EFINT,DEFNG,DEFSTR,ELSE,GOSUB,GOTO
1200 DATA INKEY$,INPUT,INSTR(,LCOPY,LEFT
$(,LINE(,LOADM,LPRINT,USING,MAXFILES
1210 DATA MID$(,NEXT,PEEK,POKE,POWER,PRE
SET(,PRINT,READ,RESTORE,RETURN,RIGHT$(
1220 DATA SOUND,SPACE$(,STRING$(,THEN
1230 FOR I%=1 TO 36:READ RW$(I%):NEXT I%
1240 ' *** Procedure Begins Here ***
1250 CLS:PRINT@44,"PCM Bar Code Program
Reader v2.1"
1260 LINE(20,4)-(219,18),1,B:LINE(22,6)-
(217,16),1,B
1270 NN%=1
1280 GOSUB 1660:IF ER%>0 THEN GOSUB 1620
:GOTO 1280
1290 IF LL%=0 AND INSTR("YN",IL$)>0 THEN
 ER%=5:GOSUB 1620:GOTO 1280
1300 IF LL%=0 THEN ON INSTR("ALSR",IL$)
GOTO 1820,1890,1980,2050
1310 IF LL%=1295 THEN 1350
1320 IF LL%<>NN% AND NN%=1 THEN ER%=1:GO
SUB 1620:GOTO 1280
1330 IF LL%<NN% THEN ER%=3:GOSUB 1620:GO
TO 1280
1340 IF LL%>NN% AND NN%>1 THEN ER%=2:GOS
UB 1620:GOTO 1280
1350 IL$=RIGHT$(IL$,19)
1360 IF LL%=1 AND NN%>0 THEN GOSUB 1780
1370 CL$=CL$+IL$
1380 FOR I%=1 TO LEN(CL$)
1390     CH$=MID$(CL$,I%,1)
1400     IF CH$="%" THEN GOSUB 1510:IF NL
% THEN 1470 ELSE GOTO 1440
1410     IF CH$="/" THEN GOSUB 1550:IF NL
% THEN 1470 ELSE GOTO 1440
1420     IF CH$="." THEN UC%=NOT(UC%):GOT
O 1450
1430     IF CH$=>"A" AND CH$<="Z" AND NOT
(UC%) THEN CH$=CHR$(ASC(CH$)+32)
1440     XX$=XX$+CH$:IF RIGHT$(XX$,1)=CHR
$(13) THEN PRINT#2,XX$;:XX$="":UC%=-1
1450 NEXT I%
1460 CL$=""
1470 PRINT@200,SPACE$(80);
1480 IF LL%<>1295 THEN NN%=LL%+1:GOTO 12
80
1490 ' *** Done ***
1500 CLOSE:CALL 61807!:CLEAR 500,HIMEM:M
ENU
1510 ' *** Decode Reserved Word ***
1520 NL%=0:IF I%>LEN(CL$)-1 THEN NL%=-1:
CL$="%":GOTO 1540
1530 I%=I%+1:CH$=RW$(INSTR(PC$,MID$(CL$,
I%,1)))
```

Submitting Material to PCM

Contributions to PCM are welcome from everyone. We like to run a variety of programs which will be useful/helpful/fun for other Tandy Portable and MS-DOS computer owners. We now support the Model 100, the Tandy 200, and the Tandy models 2000, 1200 and 1000.

Program submissions must be on tape or disk, and it is best to make several saves, at least one of them in ASCII format. We're sorry, but we do not have time to key in programs. All programs should be supported by some editorial commentary explaining how the program works. Generally, we're much more interested in how your submission works and runs than how you developed it. Programs should be learning experiences.

Pay for submissions is based on a number of criteria. The rate of remuneration will be established and agreed upon prior to publication.

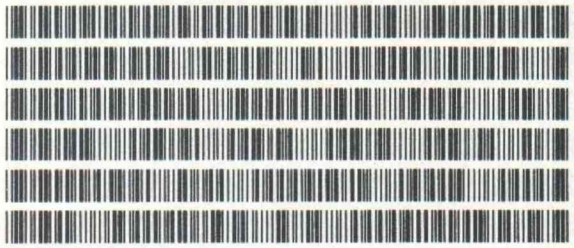
For the benefit of those who wish more detailed information on making submissions, please send a SASE to: Submissions Editor, PCM, P.O. Box 385, Prospect, KY 40059. We will send you comprehensive guidelines.

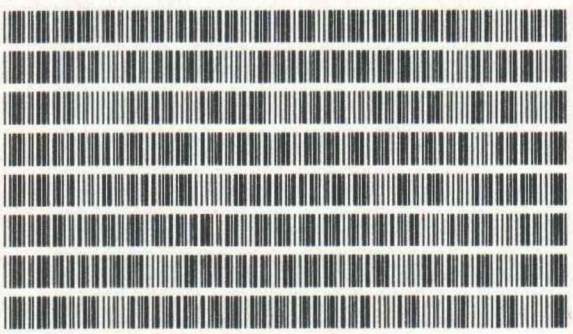
Please do not submit programs or articles currently submitted to another publication.

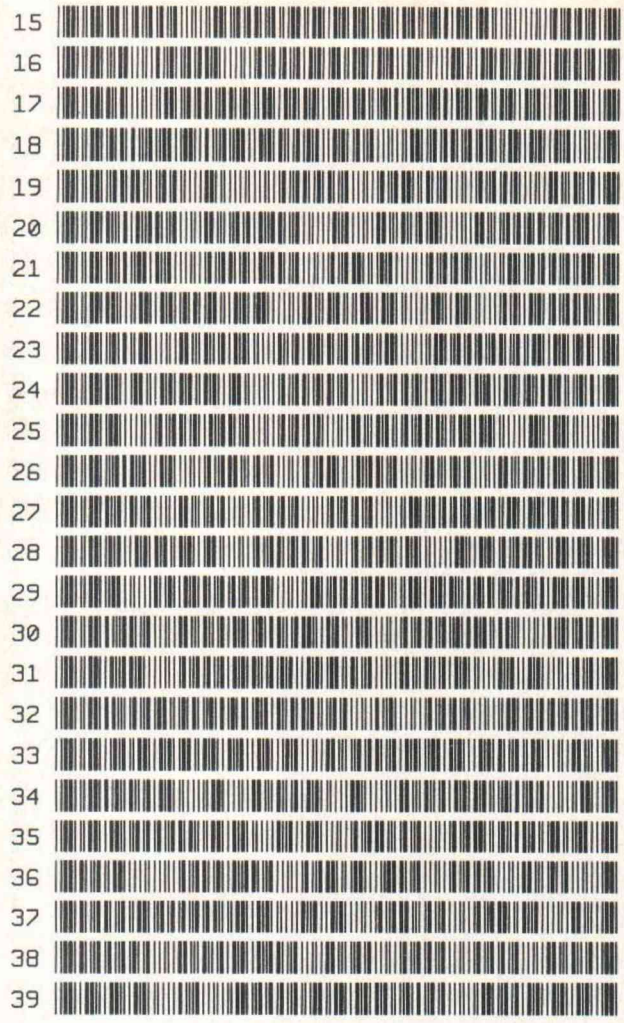
If you feel qualified to review software and/or hardware products for computers covered in PCM, send us your name, address and phone number; we will send you a questionnaire form and a copy of our reviewer guidelines.

```
1540 RETURN
1550 ' *** Decode Hex and Control Charac
ters ***
1560 NL%=0:IF I%>LEN(CL$)-1 THEN NL%=-1:
CL$="/":GOTO 1610
1570 I%=I%+1:IF INSTR("/%.",MID$(CL$,I%,
1))>0 THEN CH$=MID$(CL$,I%,1):GOTO 1610
1580 IF I%>LEN(CL$)-1 THEN NL%=-1:CL$=RI
GHT$(CL$,2):GOTO 1610
1590 HX$=MID$(CL$,I%,2):CH$=CHR$((INSTR(
"0123456789ABCDEF",LEFT$(HX$,1))-1)*16+I
NSTR("0123456789ABCDEF",RIGHT$(HX$,1))-1
)
1600 I%=I%+1
1610 RETURN
1620 ' *** Error Codes ***
1630 SOUND 5000,10:SOUND 8000,10:SOUND 5
000,10
1640 PRINT@220-.5*LEN(ER$(ER%)),ER$(ER%)
;
1650 RETURN
1660 ' *** Get Code Line ***
1670 PRINT@173,"";:PRINT USING "Scan lin
e ###";NN%
1680 IF NN%=-1 THEN PRINT@173,"Scan any
line":GOTO 1700
1690 SOUND 500,5
1700 INPUT#1,IL$:ER%=0
1710 FOR I%=1 TO LEN(IL$)
1720 IF MID$(IL$,I%,1)="!" THEN MID$(IL$
,I%,1)="."
1730 NEXT I%
1740 IF LEN(IL$)<>1 AND LEN(IL$)<>21 THE
N ER%=4:RETURN
1750 IF LEN(IL$)=1 THEN LL%=0:RETURN
1760 LL$=LEFT$(IL$,2):LL%=(INSTR("012345
6789ABCDEFGHIJKLMNOPQRSTUVWXYZ",LEFT$(LL
$,1))-1)*36+INSTR("0123456789ABCDEFGHIJK
LMNOPQRSTUVWXYZ",RIGHT$(LL$,1))-1
1770 RETURN
1780 ' *** Open Program File ***
1790 PN$=LEFT$(IL$,6):IL$=RIGHT$(IL$,LEN
(IL$)-6)
1800 OPEN PN$ FOR OUTPUT AS #2
1810 RETURN
1820 ' *** Abort ***
1830 BEEP:BEEP:BEEP
1840 PRINT@209,"ABORT!  Are you sure?";
1850 INPUT#1,AN$
1860 IF INSTR("YN",AN$)=0 THEN BEEP:PRIN
T@251,"Scan 'YES' or 'NO'":GOTO 1850
1870 PRINT@200,SPACE$(80);
1880 IF AN$="Y" THEN CLOSE:KILL PN$+".DO
":GOTO 1490 ELSE GOTO 1280
1890 ' *** Skip Line ***
1900 IF NN%=1 THEN ER%=6:GOSUB 1620:GOTO
 1280
1910 BEEP:BEEP:BEEP
1920 PRINT@210,"SKIP!  Are you sure?"
1930 INPUT#1,AN$
1940 IF INSTR("YN",AN$)=0 THEN BEEP:PRIN
T@251,"Scan 'YES' or 'NO'":GOTO 1930
1950 PRINT@200,SPACE$(80);
1960 IF AN$="Y" THEN NN%=NN%+1
1970 GOTO 1280
1980 ' *** Stop & Save ***
1990 BEEP:BEEP:BEEP
2000 PRINT@207,"STOP & SAVE! Are you sur
e?";
2010 INPUT#1,AN$
2020 IF INSTR("YN",AN$)=0 THEN BEEP:PRIN
T@251,"Scan 'YES' or 'NO'":GOTO 2010
2030 PRINT@200,SPACE$(80);
2040 IF AN$="Y" THEN 1490 ELSE GOTO 1280
2050 ' *** Resume ***
2060 IF NN%<>1 THEN ER%=5:GOSUB 1620:GOT
O 1280
2070 PRINT@254,"Resume Mode";
2080 NN%=1:GOSUB 1660
2090 IF LL%=0 THEN ER%=5 ELSE IF LL%<>1
THEN ER%=1
2100 IF ER%>0 THEN GOSUB 1620:GOTO 2060
2110 PN$=MID$(IL$,3,6)
2120 ON ERROR GOTO 2140
2130 OPEN PN$ FOR INPUT AS #2:GOTO 2170
2140 RESUME 2150
2150 CLOSE #2
2160 ER%=7:GOSUB 1620:GOTO 1270
2170 CLOSE #2:OPEN PN$ FOR APPEND AS #2
2180 NN%=-1:GOTO 1280
```

SEARCH (FROM PAGE 26)







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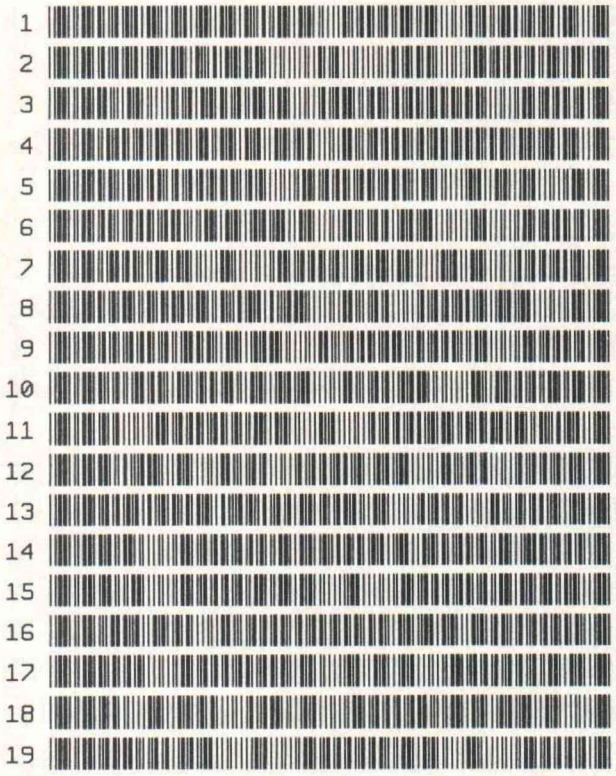

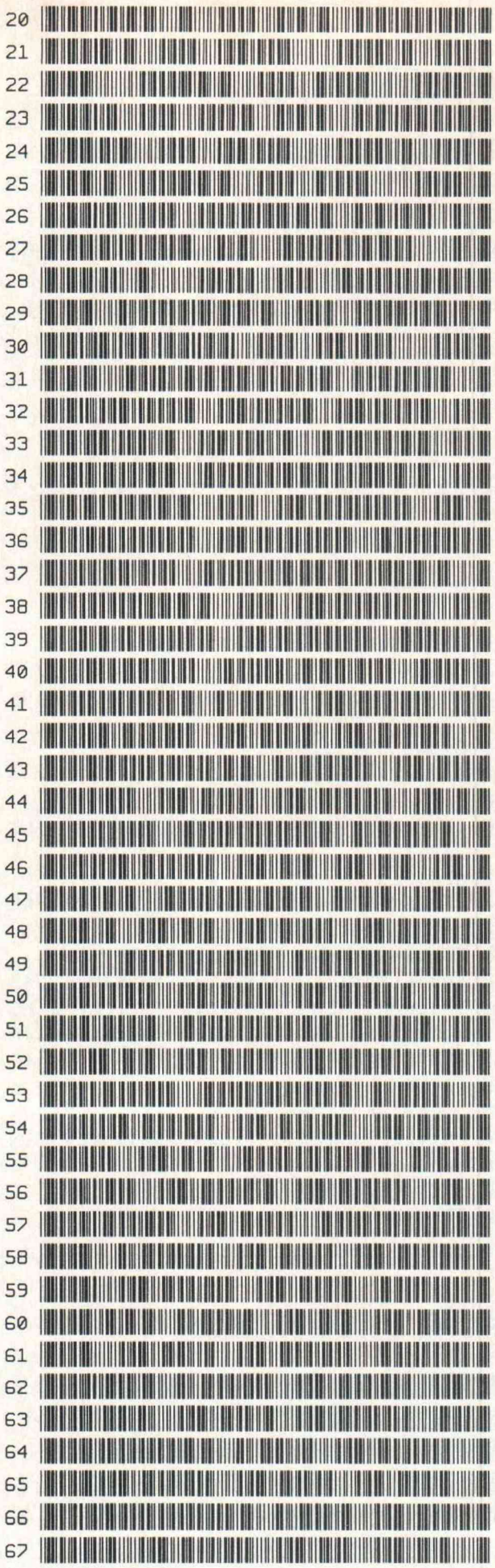

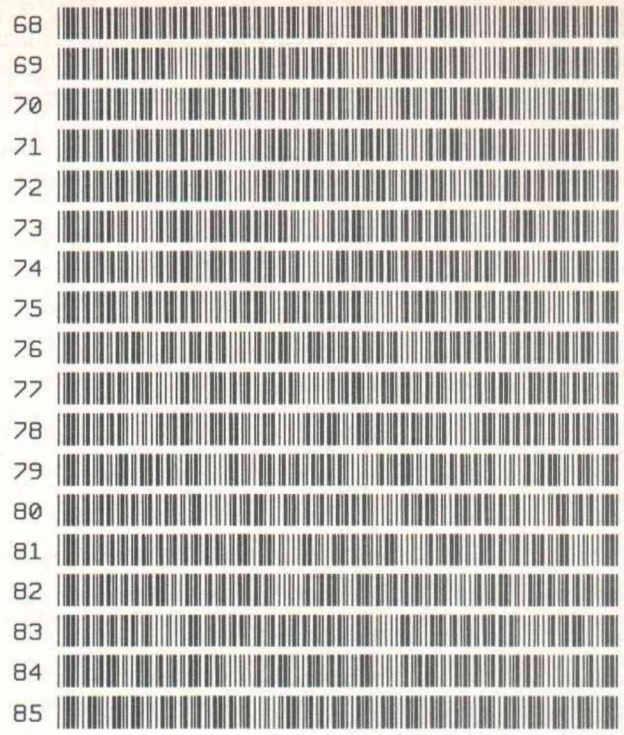

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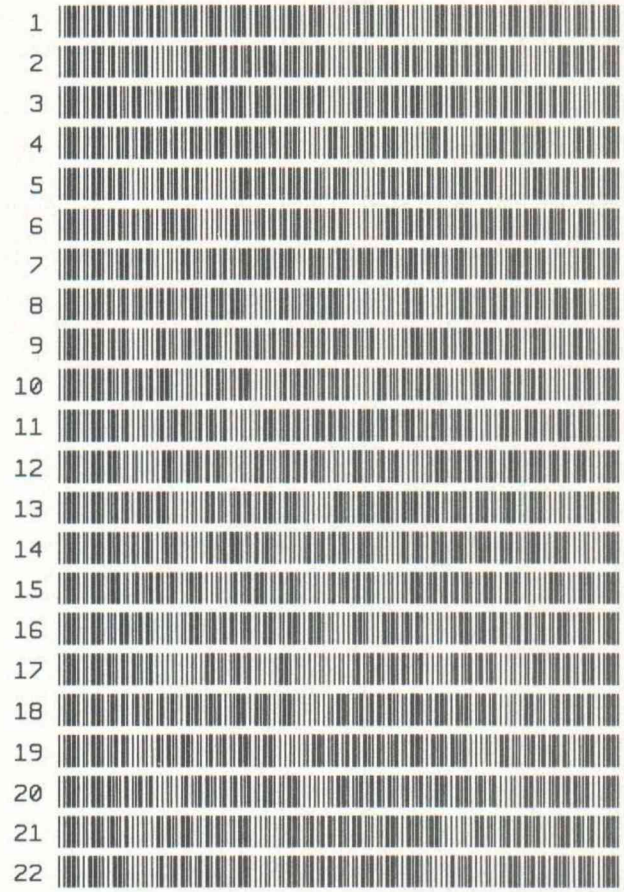

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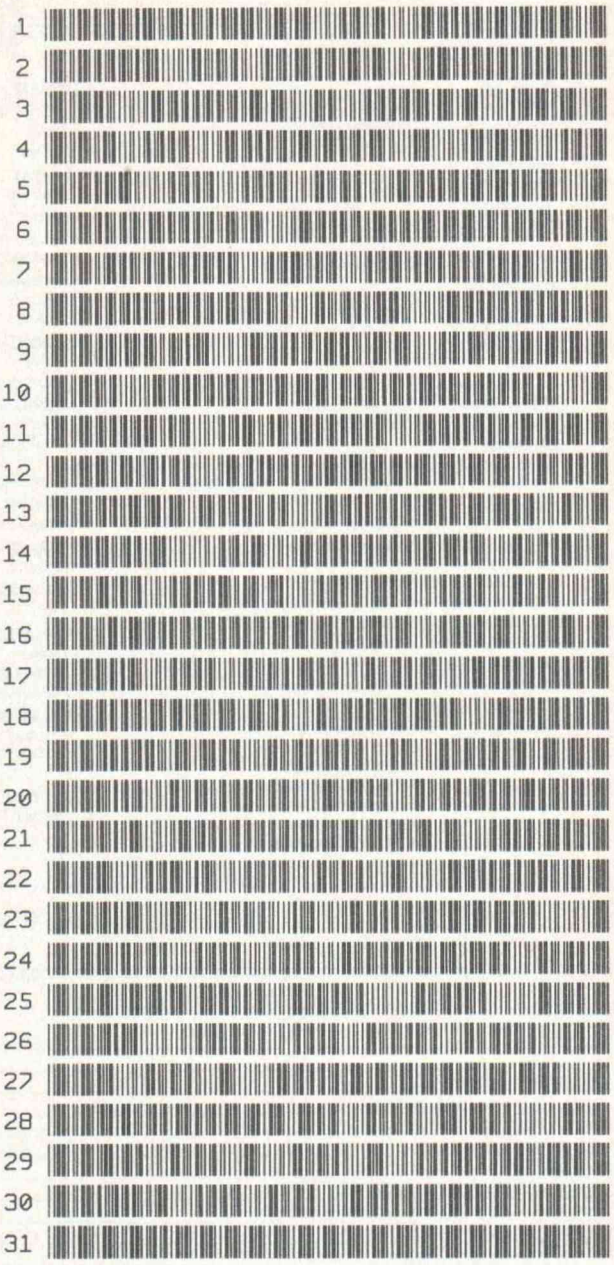

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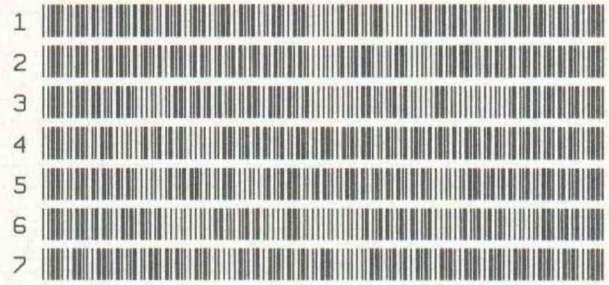

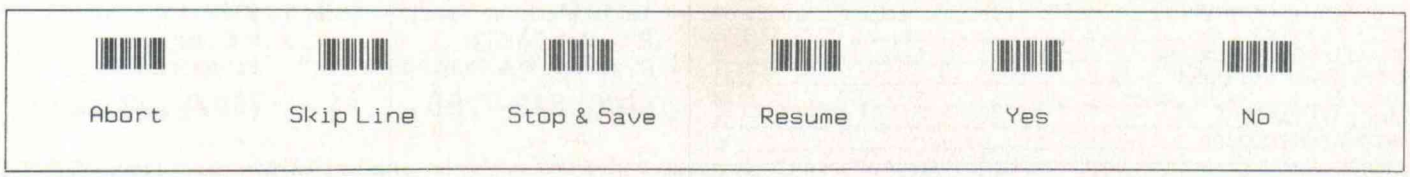

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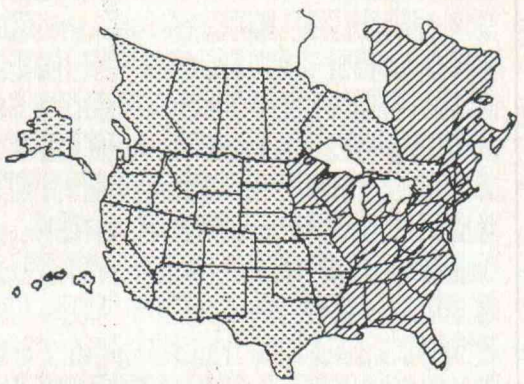

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